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Estimation of Direct Financial Burden of Unnecessary Admission and Stay in the Internal and Surgical Wards of Teaching Hospitals in Yazd City:2021

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Abstract

Introduction: All managers should strive to make the most of the available facilities to avoid wasting resources. This study aimed to estimate the direct financial burden of unnecessary admissions and stay days in the Internal and Surgical Wards of Teaching Hospitals in Yazd City.

Methods: A total of 272 cases were selected using the stratified sampling method in 2021, and each hospital was considered as a statistical class. Protocol Evaluation Appropriateness was used to collect the data. Multiple logistic regression analysis was used to determine the impact of demographic variables on the type of admission and also on the type of stay day through SPSS22.

Results: The results showed that 5.5% of admissions and 19.4% of stay day were deemed unnecessary, and the chance of unnecessary admission in the surgical ward compared to the internal ward was about 75% (P=0.037, OR 0.25) and in patients with basic insurance was about 74% lower than those without basic insurance. The cost of unnecessary admission and stay was estimated at 310.294.000 IR Rials.

Conclusions: There is a need to establish interaction between the health insurance organization and other basic insurance organizations with managers and officials of hospitals and monitor the cases, so that admissions and inappropriate hospital days are reduced.

Keywords: Financial management, Hospital, Hospital admission, Length of stay

Introduction

Nowadays, health policymakers focus on the most expensive part of the service, such as hospital services. Hospital services account for almost half of the total costs of the health sector. Therefore, improving the efficiency of hospital services can be considered as one of the policy options in relation to cost reduction and utilization of the potential capacities of healthcare institutions. There is the challenge of increasing healthcare costs not only in developed countries, but also in developing countries, such as Iran. According to statistics, the overall cost index in Iran is 30% over the last 20 years, while this has increased 71 times in health sector expenditures (1, 2).

In the meantime, hospital services are considered as the most expensive part of the health systems (3). The bulk of the budget of the Ministry of Health is allocated to hospitals around the world (4), and according to a World Health Organization report, hospitals make up about 80 percent of the health sector's government resources and produce only 20 percent of its output (5-7).

Unnecessary admission and stay day are considered as one of the problems that cause the waste of health system resources and reduce the efficiency of the hospital. High costs are imposed on the health system for each admission or for each

day of unnecessary stay (8). Therefore, there is a need to know the data related to the necessity and non-necessity of admissions and stays to assist managers in decision-making and planning, as well as to improve the allocation of resources and increase medical services in service organizations (9, 10). On the other hand, inappropriate or unnecessary use of hospital services has no benefit for patients and does not lead to their recovery, and the same treatment with the same benefits and quality and the same result could be received by patients at lower levels and outside the hospital. This inappropriate or unnecessary use takes place both in the form of unnecessary admission and in the form of unnecessary hospital days (11).

Given the results of numerous studies conducted in Europe and the United States in relation to the use of hospital beds, about 4-38% of hospital admissions and 10-25% of the patients' days of stay are necessary (12). King et al. (13) during their study found that the rate of unnecessary admissions in hospitals in five cities in China was 33.4%, and Venoy et al. (14) reported that unnecessary admissions were 35% in the cardiovascular ward and 38.7% in the orthopedic ward of a Shanghai hospital. Carnsal et al. reported that 38.2% of admissions and 18.1% of stays were inappropriate in Italian education hospitals (15).

In Iran, some studies have also investigated this issue; for example, Mahfouzpour et al. reported that the admission of 5.8% of patients and 9.93% of stay days were unnecessary (16). One study revealed that inappropriate admission to hospitals in the capital of Iran was 7% and that inappropriate stays was approximately 20% (17). Overall data of Iranian hospitals showed that the rate of unnecessary admission of patients was 2.7% (18).

Unnecessary admission and stays are considered as one of the weaknesses for the healthcare system of any country. Moreover, the lack of necessary tools to differentiate between necessary admissions and unnecessary admissions and determining unnecessary stays, and on the other hand, the lack of effective legal criteria for non-approval and payment of admissions and unnecessary stay days have caused the admission to be covered by insurance and their costs to be paid by the organization (20).

Therefore, by review of the annual costs of the hospital beds in the country, the amount of costs imposed is determined without considering the inevitable costs, the costs simply imposed on the healthcare system with unnecessary bed occupancy. In addition to the economic dimension, from a social point of view, unnecessary presence of the patient in the hospital has consequences such as deactivation of the community labor force and the resulting damage,

job restrictions, emotional and psychological problems in families and, consequently, loss to society, time, and energy of the service sector (21). The present study was conducted due to the importance of the issue with the aim of estimating the direct financial burden of unnecessary admission and stays in selected teaching hospitals in Yazd.

Methods

Data Collection

The present study was conducted by reviewing the case of the patients discharged in the two teaching hospitals in Yazd city. Yazd, a world heritage city, is located in the center of Iran. Given the type 1 error (α)=0.05 and z_(1-α/2)-z_(0.975)-1.9666, a total of 272 patients admitted to the hospitals were selected through the stratified sampling method. The main criterion for inclusion was to have at least one day of hospital stay. Also, mental patients were excluded from the study.

Appropriateness Evaluation Protocol (AEP)

The Appropriateness Evaluation Protocol (AEP) was used to collect the data in this study; it was first developed by Restuccia Gertman and Boston in 1981 and approved by the Review Organization (PSRO: Professional Standards) (22). The AEP was translated and validated for Iranian population (23).

The AEP has three parts: the first part includes demographic information of patients, the second part includes 13 criteria of necessary patient admission, according to which, patient admission is considered necessary when he/she has at least one item at the time of admission or more than one of the thirteen criteria, and the third section contains 27 criteria related to the patient's essential hospital stay; the patient's stay is considered necessary if at least one patient has one of the twenty-seven criteria on each day of stay.

In accordance with the first day of admission and stay of patients, according to the criteria of Table 1, the AEP was considered from the second day of admission to the time of discharge of the patient in terms of necessity. This process continued until the number of samples was completed.

Estimation of Costs

The direct financial burden resulting from unnecessary admissions and stay was calculated according to the tariff approved by the Ministry of Health and Medical Education. The amount of financial loss due to unnecessary stays of the patient was estimated. The cost of absenteeism was also estimated for patients in the working age group who

Table 1: Relationship between necessary and unnecessary admission with study variables

Variable	Levels	Univariate		Multivariate	
		OR (95% CI)	P value	OR$_{adj}$ (95% CI)	P value
Ward	Surgery	1	0.05	1	0.037
	Internal	0.28 (0.079-1.035)		0.247 (0.06-0.092)	
Gender	Female	1	0.56	-	-
	Male	0.36 (0.12-1.09)		-	
Basic insurance	Yes	1	0.06	1	0.035
	No	0.32 (0.096-1.08)		0.26 (0.07-0.9)	
Duration of stay (Day)	<5	1	0.65	-	-
	>5	0.78 (0.27-2.26)			

Table 2: Frequency distribution and percentage of demographic variables

Variable	Levels	Frequency	Percentage
Ward	Surgery	123	45.20
	Internal	149	54.80
Gender	Male	154	56.60
	Female	118	43.40
Basic insurance	Yes	241	88.60
	No	31	11.40
Duration of stay (Day)	<5	178	65.40
	>5	94	34.60

had unnecessary admission and stays in order to more accurately estimate these costs. For this purpose, the time index was used to calculate, and the minimum daily wage approved by the Ministry of Labor was used, which was 505,626 IR Rials to convert it into a cost. This study was approved by the Committee of Shahid Sadoughi University of Medical Sciences (Approval Number: IR.SSU.SPH.REC.1399.066).

Statistical Analysis

Given that the Kolmogorov-Smirnov showed that the data distribution was normal (P>0.5), the mean index and standard deviation were used to perform descriptive statistics of quantitative variables, and for qualitative variables, frequency and frequency percentage were used. Pearson's Chi-squared test was used to perform inferential statistics and examine the relationship between qualitative variables. Multiple logistic regression analysis was used to determine the impact of demographic variables on the type of admission and also on the type of stay. The statistical analyses were performed in SPSS 22.0 Software.

Results
As shown in Table 2, 54.80% of the patients were admitted to the internal ward and 56.60% of the samples were male. The majority of the patients (88.6%) had basic insurance; and 65.40% of them had a stay of less than 5 days. The mean age of the patients was 46.75±2.51 years.

Results showed that about 5.5% of admissions (15 cases) and 19.4% of stays (53 cases) were unnecessary. The differences between unnecessary admission and stays with necessary admission and stays were statistically significant (P<0.0001).

The Adjusted Odds Ratio (AOR) in the surgical ward compared to the internal ward showed that the chance of unnecessary admission in the surgical ward was about 75% lower (P=0.037, OR=0.25). According to the adjusted odds ratio in patients with basic insurance compared to patients without basic insurance, the chance of unnecessary admission in patients with basic insurance was about 74% lower than those without basic insurance (P=0.035, OR=0.26) (Table 1).

The adjusted odds ratio of patients with basic insurance to that of patients without basic insurance is shown in Table 3. As shown, the chance of unnecessary stays in patients with basic insurance was about 68% lower than those without basic insurance (P=0.008, OR=0.32)

Table 4 shows the number of days of unnecessary admission and stays in three months in the two hospitals of Shahid Sadoughi and Shahid Rahnemoun, which is 94 days and its financial burden is equal to 310.294.00 (Iranian Rials).

It should be noted that according to the tariff of the Ministry of Health, the cost of one night's stay and also the cost of one night of nursing care were set equal to 2.63.000 and 1.238 000, respectively.

Table 3: Relationship between necessary and unnecessary stays with study variables

Variable	Levels	Univariate		Multivariate	
		OR (95% CI)	P value	OR$_{adj}$ (95% CI)	P value
Hospital name	Shahid Sadoughi	1	0.145	1	0.89
	Shahid Rahnemoun	0.62 (0.33-1.7)		0.89 (0.16-5.05)	
Ward	Surgery	1	0.352	-	-
	Internal	1.33 (0.73-2.42)		-	
Gender	Female	1	0.539	-	-
	Male	1.21 (0.66-2.23)		-	
Basic insurance	√	1	0.001	1	0.008
	×	0.276 (0.125-0.607)		0.32 (0.14-0.74)	
Duration of stay (Day)	<5	1	0.132	1	0.84
	>5	1.6 (0.87-2.95)		1.09 (0.46-0.58)	
Age	-	0.99 (0.98-1.008)	0.56	-	-

Table 4: Financial burden due to unnecessary admissions in the studied hospitals (Iranian Rials)

Wards	(A)*	(B**)	(C***)	Financial burden due to unnecessary admission (A×C)	Financial burden due to unnecessary stays (B×C)
Surgery	1	26	3.301.000	3.301.000	85.826.000
Internal	8	23	3.301.000	26.408.000	75.923.000
Total	9	49	-	29.709.000	161.749.000
Surgery	2	16	3.301.000	6.602.000	52.816.000
Internal	4	14	3.301.000	13.204.000	46.816.000
Total	6	30	-	19.806.000	99.030.000
	15	79	-	49.515.000	260.779.000

*A: Number of unnecessary admission days; **B: Number of unnecessary hospital stays; ***C: Total costs (cost of one night stay+cost of one night of nursing care)

Discussion

This study aimed to estimate the direct financial burden of unnecessary stay in selected teaching hospitals in the center of Iran, Yazd, and the appropriateness evaluation protocol was used in this study. The results of this study show that the rate of unnecessary admission in the internal and surgical wards in the hospitals was 5.5%, which was consistent with some studies conducted in Iran. Mahfouzpour et al. (24) reported that the rate of unnecessary admission in Karaj hospitals was 5.8%, and the other study conducted in the south of Iran showed that the rate of unnecessary admission was 6.7% (17). When this result compare with findings obtained from the study stays of patients in the internal and surgical wards in the hospitals was 5.5% and 19.4%, respectively,??? which is consistent with the results of some studies conducted in Iran. The studies showed that the rate of unnecessary admission was between 5.8% and 7%. Mahfouzpour et al. (24) reported that the rate of unnecessary admission and stays of inpatients in Karaj hospitals was 5.8%. Khosravi et al. (17) during a study on Kerman hospitals revealed that the rate of admission and unnecessary stays in Kerman hospitals was 6.7%.

Pourreza et al. reported that the unnecessary admission rate was 22.8%, and the unnecessary stays rate was 8.6% (20) which was not consistent with our study. Overall review showed that the rate unnecessary admission and stay days was different in other countries. Research conducted in foreign countries has also reported different percentages. Neumann Coulon-Schultz (25), during a study at the Turkish Army Hospital, estimated the rate of unnecessary admissions at 4.8%; also, other researchers including Gardiner et al. (26) reported 24.7% of admissions, Vossius et al. (27) 7% of admissions in Norway, soria-aledo et al. (28) 7.4% of admissions in Spain in 2012, Menand et al. (29) 0.7% of admissions in 8 French hospitals, Ward et al. (30) 7.7% of admissions in 2 UK hospitals 7% of admissions were unnecessary, which is almost similar to the present study.

Koldborg et al. (31) during a study in a hospital in Denmark found that unnecessary admissions were 14%, and Thollander et al. (32) in their study reported that unnecessary admissions in Swedish hospitals was 23%. Perhaps, the estimated difference in the rate of unnecessary admissions in different hospitals can be attributed to differences in admission processes, geographical location of the hospitals studied, hospital occupancy, and the number of active beds in each of these hospitals. Also, Carnsal et al. during

a study in Italian education hospitals and in the internal, surgical and orthopedics wards concluded that inappropriate stays was 18.1%, which is not in the same line with those of the present study (15).

In general, the factors affecting the number of hospital admissions and stays include hospital factors such as the large number of hospital beds, workload, work complexity, and hospital size (33); also, the factors that have delayed discharge, such as counseling, delay in diagnostic tests, hospital stay, patient waiting for surgery, waiting for the patient to receive diagnostic tests, waiting for the patient to visit, etc. affect the unnecessary admission and stays (34). The factors affecting unnecessary referral and admission of patients in the hospital include the lack of services in the lower levels of the health care system, failure to visit the hospital through the referral system and in fact self-referral, which may be due to the lack of awareness of and people's trust in the lower levels of the referral system, avoidance of outpatient examinations of the emergency department, and the lack of communication between doctors in private clinics and the hospital medical team. In general, incorrect admission procedures may also be considered as a factor in misuse of hospital beds (34).

According to the results of the logistic regression test in this study, the ward and insurance variables were those predicting unnecessary admission, and the chance of unnecessary admission in the surgical ward was about 75% lower than the internal ward (P=0.037, OR 0.25); in people who had insurance, it was about 74% less than those without insurance (P=0.035, OR=0.26). Also, according to the adjusted odds ratio in patients with basic insurance compared to those without basic insurance, in patients with basic insurance it was about 68% lower than those without basic insurance (P=0.008, OR=0.32). The results of this study are not consistent with those of Mahfouzpour's study which showed that the hospital was the variable predicting unnecessary admission, and the chance of unnecessary admission in Bahonar Hospital was more than Shahid Rajaei Hospital (24).

This study has estimated that the amount of financial loss due to unnecessary admission days in Shahid Sadoughi and Shahid Rahnemoun hospitals in the three months of 2020 was equal to 495.515.000 Rials, and the amount of financial loss due to unnecessary stay days in Shahid Sadoughi and Shahid hospitals during three months of 2020 was equal to 260.779.000 Rials. Also, the cost of absenteeism due to unnecessary admissions and stay in three months in Shahid Sadoughi and Shahid Rahnemoun hospitals was equal to 47.528.544 Rials. Mahfouzpour et al. (24) reported during a study that the amount of financial loss caused by unnecessary stay in three months in Shahid Rajaei and Shahid Dr. Bahonar hospitals was 444,320,521 Rials.

Therefore, given that it is necessary to calculate the indirect costs of the lost opportunity and also intangible costs such as pain, suffering, or anxiety to the patient or their relatives to calculate the costs of unnecessary stays, the exact amount of financial damage caused by the day of unnecessary stays should be calculated, but it is certain that the unjustified presence of the patient in the hospital will be accompanied by the cost of daily beds and unnecessary hoteling, which can be calculated as the least economic loss. Although this cost is considered income for the hospital, it is ultimately an unnecessary cost imposed on the payers (insurer or patient) which increases the financial burden of the health system (36).

Lack of full recording of information in the medical records of a small number of patients was raised as a limitation of the present study. Also, the impossibility of calculating the indirect financial burden due to the unavailability of data was considered another limitation.

Conclusion

According to the results of this study, part of the waste of hospital resources can be attributed to unnecessary admissions. Regarding the costs incurred due to unnecessary patient stay in the hospital, it is clear that such unnecessary costs are imposed on three groups of the patients, hospital and insurance organizations. It is clear that by reducing such costs, insurance companies and hospitals, especially public hospitals, will benefit from better opportunities to organize their services and reduce unnecessary costs, and by reducing the care cost, high health care costs will not be imposed on the patient d.

The results showed that the AEP protocol had a good validity for evaluating the appropriateness of admission and stay days according to numerous studies. Therefore, it is necessary to establish the interaction between the Health Insurance Organization and other basic insurance organizations with managers and officials of hospitals in line with the strategic goal of cost management and control to reduce admissions and inappropriate hospital days; in this way, an Appropriateness Evaluation Protocol is used to determine inappropriate admissions and stay days, and non-payment becomes operational for inappropriate stay days as a monitoring tool in evaluations and review of hospital admissions documents.

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Authors' Contribution

H.J, H.A, R.A and E.M designed the study; H.J and E.M collected the data. E.M, H.J, H.A and F.M analyzed the data; and H.J and E.M wrote the initial draft. All the authors read and approved the final manuscript.

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Ethical Approval

The ethics committee of Shahid Sadoughi University of Medical Sciences approved this study (IR.SSU.SPH.REC.1399.066.)

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