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A Survey on Factors Contributing to Hospital Patient Readmission

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Abstract

Background and Objectives: Patient readmission is an important criterion in performance evaluation of healthcare settings. Identifying the causes of the readmissions would help the policymakers in designing strategies for efficient management of health facilities. This stud aimed to explore factors contributing to readmission by sampling from an Iranian hospital.

Methods: Clinical records of 385 patients who had at least one readmission in the hospital during the period of four months were reviewed, retrospectively. Patients' demographic data, physicians' information, and the factors related to readmission were extracted from the clinical records. Common factors contributing to readmission were identified by literature review and were grouped into five major categories. Chi-square test was used to determine the relationship between the nominal variables.

Findings: The main cause of patient readmission was found to be medical checkup (37.2%), followed by disease complications (15.9%) and surgery complications (12.2%). Moreover, frequency distribution of readmissions were significantly different concerning the background variables including insurance coverage, duration of hospitalization, sex, place of residence, and way of discharge. Furthermore, the frequencies of the five reasons of patient readmission were significantly related to sex, insurance coverage, duration of hospitalization, nature of treatment, and type of discharge were identified. No significant relationship was found between patients' place of residence and readmission causes.

Conclusions: The fact that readmission rate is influenced by multiple factors highlights the need for development of systems approaches to alleviating the rate of unnecessary readmission of patient to health facilities.

Keywords: Hospitalization, Hospital, Readmission, Patient, Performance

Background and Objectives

In most developing countries, 10 to 54 percent of the government budgets are allocated to healthcare services, of which about half is spent by the hospitals [1]. In Iran, healthcare services are responsible for 50 to 80%of the whole hospital expenses [2]. Statistics shows that, about 60 percent of the total hospital expenses are related to readmission [3]. It is not only developing countries that face with this problem; according to the reports about 17.6% of hospitalizations in US are due to readmission which costs Medicare $15 billion [4]. The frequency of readmission varies from 5% to 14% of total admissions, while it is reported up to 35% for high-risk patients, including the elderly patients [5].

Readmission is defined as an admission to a subsection of a hospital within 30 days of a discharge from the same or another hospital subsection [6-7]. Readmission is considered as an indicator of healthcare quality inefficiency [8, 9, 10] and one of the major contributing factors in increased healthcare expenses [11, 12, 13].

Numerous studies have introduced readmission as an avoidable phenomenon [14-15]. Given the importance of issue, several studies have been carried out aiming at identifying the causes of readmission. Grim *et al.* [16] identified disease progression and development of new co-morbidity as the main causes of readmission. Arab *et al.* concluded that the main reason for the third readmission is treatment follow up [16]. At present, many hospitals in Iran are faced with increasing demands, and patient readmission [16].

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Therefore, the present study aimed to explore the causes of hospital readmissions.

Methods

Setting and Sample

This descriptive-analytical study was carried out from March 2012 to June 2012 in Sina Hospital, affiliated with Tehran University of Medical Sciences. Subjects were patients with at least one hospital readmission in the hospital during the survey period of four months. From the total450 readmitted patients, 385 who had a complete clinical record were selected for the survey.

Data Collection

The patients' clinical records were reviewed retrospectively with the assistant of a resident of emergency department. Patients' demographic data, physicians' information, and the factors contributing to readmission were extracted from the clinical records.

Data Analysis

Literature survey identified 12 potential influencing factors for patient readmission, including disease complications, surgery complications, disease progression, treatment follow-up, infection, incomplete treatment, wrong diagnosis, discharge against medical advice, patients' indifference, temporary discharge, surgery abandonment, and irrelevant factors. These factors were combined and grouped into five major categories. Chi-square test was used to determine the relationship between the nominal variables. All statistical analyses were carried out using SPSS Version 18 Software.

Results

Descriptive Statistical Analysis

Table 1 describes demographic and clinical characteristics of the patients surveyed. Of the total patients, 68.1% were male, 64.8% lived in of Tehran, 88.1% were covered by insurance, 72.2% had hospitalization duration of more than two days, 52% were readmitted due to surgery problems, and 87.5% were discharged according to physician order. Average length of patient stay was six days.

Treatment follow-up was identified as the major cause of readmission (37.2%), followed by disease complications (15.9%), surgery complications, and discharge against medical advice (12.2%) (Table 2).

Inference Statistical Analysis

Using Chi-square test, a significant relationship was identified between patients' gender and readmission contributing factors ($\chi^2 = 9.58$, P = 0.048).No significant relationship was found between readmission contributing factors and patients' residence ($\chi^2 = 5.73$, P = 0.221). Furthermore, readmission contributing factors were found to be significantly related to patients' insurance coverage ($\chi^2 = 17.38$, P = 0.002), length of stay ($\chi^2 = 57.34$, P < 0.001), nature of treatment ($\chi^2 = 50.13$, P < 0.001), type of discharge ($\chi^2 = 279$, P < 0.001), and medical expertise ($\chi^2 = 100.3$, P < 0.001) by 95% confidence interval (Table 3).

Frequency of readmission was different within each background/demographic groups, including gender($\chi^2 = 49.52$, P < 0.001), patients' residence ($\chi^2 = 33.18$, P < 0.001), insurance coverage ($\chi^2 = 218.5$, P < 0.001), length of stay($\chi^2 = 74.96$, P < 0.001), and type of discharge ($\chi^2 = 210.5$, P < 0.001).Therefore, it could be concluded that males compared to females, Tehran (Capital) residents compared to other provinces residents, insured compared to uninsured patients, patients hospitalized more than two days compared with patients hospitalized one or two days, and patients routinely discharged compared with those discharged against medical advice are more frequently subject to readmission. However, concerning nature of treatment, no significant difference between the surgery and medical groups' frequency of readmission was identified (Table 1). According to our assessment, about 28% of the readmissions could be prevented.

Discussion

In the present study, the major factor contributing to patients' need for readmission was found to be treatment follow-up, followed by disease complications. While our results are consistent with those of various studies carried out in Iran [16, 17, 18, 19], factors leading to readmission are different specially in other countries. It seems that in non-Iranian studies, factors contributing to readmission [except those related to patients' background characteristics] are mostly related to disease progression where treatment follow-ups have a low contribution [20]. For instance, while disease progression accounted for only 3% of readmissions in the present study, Wiliams and Fitton reported disease progression as the main cause of readmission in England, where treatment follow-up was responsible for only 5% of total readmissions [21]. One of the reasons that could justify the difference between the Iranian and non-Iranian studies would be inappropriate admission prices. The ratio of inappropriate admissions in a study carried out in two educational hospitals in Iran (which was remarkably similar to the hospital in this study) was about 23%, which can justify the high frequency of readmission due to treatment follow-up [22].

Table 1 Frequency distribution of readmissions based on the patients' background characteristics

Variable	Categories	Frequency	Percentage frequency	χ^2	Significance
Sex	Male	258	68.1%	49.52	< 0.001
	Female	121	31.9%		
Place of residence	Tehran (capital)	245	64.8%	33.18	< 0.001
	Other provinces	133	35.2%		
Insurance	Non-covered	45	11.9%	218.5	< 0.001
	Covered	332	88.1%		
Length of stay	1-2 days	106	27.8%	74.96	< 0.001
	> 2 days	275	72.2%		
Nature of treatment	Surgery	177	52%	0.576	0.448
	Medical	163	45%		
Type of discharge	Physician	328	87.5%	210.56	< 0.001
	Patient	47	12.5%		

Table 2 Frequency distribution of factors contributing to the readmission

Causes	Frequency	Percentage Frequency
Treatment Complications (Factor 1)		
Disease complications	61	15.9
Surgery complications	47	12.2
Disease progression	3	0.8
Infection	5	1.3
Patient Oriented Causes (Factor 2)		
Discharge against medical advice	47	12.2
Patients' indifference	5	1.3
Treatment Follow-up (Factor 3)		
Treatment follow-up	143	37.2
Irrelevant (Factor 4)		
Irrelevant	27	7
Other Causes (Factor 5)		
Incomplete treatment	9	2.3
Wrong diagnosis	8	2.1
Surgery abandonment	26	6.7
Others	3	0.8
Total	384	100

Table 3 The relationship between factors contributing to the readmission and patients' background characteristics

Variable	Background characteristics	Frequency of factors contributing to the readmission					χ^2	Significance
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5		
Sex	Male	78	40	97	19	23	9.543	< 0.005
	Female	36	11	43	8	23		
Residence	Tehran (capital)	69	34	86	22	33	5.726	.231
	Other provinces	44	17	54	5	13		
Insurance	Uncovered	6	14	16	2	7	17.381	< 0.005
	Covered	107	37	123	25	39		
Length of stay	1-4 days	36	40	87	16	32	57.345	<0.001
	5-8 days	27	6	35	5	9		
	9 days≤	51	6	19	6	5		
Nature of treatment	Surgery	83	8	71	9	5	50.134	<0.001
	Medical	32	11	66	16	38		
Type of discharge	Physician	115	8	137	23	44	279.56	<0.001
	Patient	0	43	0	3	1		

Comparing finding of different studies, it is concluded that there is no general consensus on the causes of readmissions [23]. This could be such due to the lack of tools and definitions, and lack of a single protocol to assess the causes of readmission.

As mentioned in the results section, frequency distribution of the five factors contributing to readmission are significantly related to the patients' gender, patients' insurance coverage, patients' length of stay, nature of treatment, type of discharge, and medical expertise. Arab *et al.* (2010) [16] also found a significant relationship between the causes of readmission and length of patient stay and medical expertise. In that study, however, readmission causes were not significantly related to insurance coverage [16].

While readmission rate can reach 35% [5], studies show that it is reducible [6, 24, 21, 25, 26]. Evidence shows that 5-79% of total readmissions can be prevented [27]. Our estimate also showed that 28% of the readmissions could be prevented. The findings of a systematic review by Joynt *et al.* show the average ratio of readmission prevention to be 27% [28], which is in excellent agreement with the findings of the present study.

In our study, males' readmission rate was found to be significantly higher than that of females, which is congruent with previous studies [29, 30]. In addition, surveys on patients who needed special medical expertise reveal that male patients were subject to hospital readmissions more frequently than their female counterparts

With respect to the impact of patients' place of residence on readmission rate, patients living in Tehran showed significantly higher readmission rate as compared to patients living in other cities. Consistently, a study by Silverstein *et al.* on 29292 patients revealed that patients living 50 miles away from the hospital under study were less inclined to be readmitted [29].

It seems that prolonged hospitalization increases the risk of readmission. Several studies have reached the same result [30, 31-36]. The average length of stay in this study was six days, and most of the readmitted patients were hospitalized more than two days (length of stay in other studies is usually reported under 1-2 days and more than two days). The highest risk was taken in a study carried out by Garrison *et al.* (2013), in which the patients who were hospitalized more than three days had readmission risk of 2.16 as compared with those hospitalized three day or less

(odds ratio= 2.16) [35].

In this study, patients covered by insurance showed higher frequency of readmission, which is consistent with the findings of previous studies [37, 38].

Our survey identified no significant difference between the readmission frequencies of patients readmitted due to surgery issues and those readmitted for other medical problems. This result is incongruent with that of Silverstein *et al.* patients who received surgery services were less frequently readmitted as compared with the patients who received other medical services [29]. The difference in the results could be attributed to the difference in subjects; in the study done by Silverstein *et al*., patients over than 65 years of age had been surveyed, while in the present study the age of the subjects was not incorporated in the analyses.

As found in several studies, patient hospital readmission could also be the result of discharge against medical advice [39-42]. However, in the present study, about 87.5% of the readmitted patients had been discharged by the physician's order, which shows a substantial difference in our results when compared to those reported by the previous studies.

Study Limitations

This study has been conducted in a single hospital. Therefore, causation must be exercised in generalization of the results.

Conclusions

This study explored factors potentially contributing to patient readmission phenomenon. It was revealed that frequency of readmission is significantly different in patients of different gender, insurance coverage, length of stay, place of residence, and type of discharge. In addition, male, insured, and prolonged hospitalized patients, and patients with place of residence were found to be more frequently readmitted to the hospital. The fact that readmission rate is influenced by multiple factors highlights the need for development of systems approaches to alleviating the rate of unnecessary readmission of patient to health facilities.

Competing Interests

The authors declare no competing interests.

Authors' Contributions

ND and ART jointly design the study and coordinated the study procedure. AT and MA reviewed the literature, contributed to data analysis, and drafted the manuscript. NG collected the data and contributed to data analysis. All authors read and approved the final manuscript.

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