Original Article

Evaluation of Appropriateness of Admission and Hospital Stay at Educational Hospital

Alireza Jeddian PhD[1,2], Ahmad Afzali MD•[1], Nazila Jafari MD[1,2]

Abstract

Background: Appropriate admissions and patients' length of stay are two of the most important indicators of efficient health care delivery in hospitals. Paying due attention to these indicators may lead to optimal use of hospital resources as well as provision of ambulatory services to a larger population of patients. The purpose of the current study is to quantify the rate of inappropriate hospital admissions and days of hospital stay to identify factors affecting them.

Methods: Data were collected regarding admissions and length of stay of 1815 patients admitted to an educational hospital in Tehran, Iran, with a total 12,629 days of hospitalization using the Appropriateness Evaluation Protocol. A qualitative study was conducted using content analysis method by analyzing data from interviews with the hospital personnel about the factors affecting patients' length of stay.

Results: The results indicated that the average length of stay in medical and surgical wards was 9.4 to 6.3 days, and 8.5% of admissions and 3.4% of stays were inappropriate. The necessity to receive nursing care and/or to receive medical services and/or the patients' conditions accounted for 57.6% of total hospitalization days, followed by the need to receive nursing care alone (36.6%). Planning/Procedures/Personnel factors were responsible for 77.3% of inappropriate stays. The qualitative study revealed that in addition to sound in house policy setting, abundance of suitable equipment and facilities at the hospital site had positively affected the appropriateness of hospital stay while incoordination of health care delivery groups, rotation of residents and other wards personnel and lack of a proper complementary patient follow-up system, had a negative impact on the same indicator.

Conclusion: Inappropriate admissions and inappropriate stays are influenced by numerous factors, both inside and outside of the hospitals; the results of the current study indicate that structural factors such as techniques adopted in the studied hospital, contributed significantly to decreasing inappropriate stays. Improving and upgrading these techniques will make optimal use of hospital beds possible.

Keywords: Appropriateness evaluation protocol, inappropriateness admission, inappropriateness hospital stay, inappropriateness length of stay

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Introduction

Rational use of hospital beds, such as patients' appropriate length of stay (LOS) and admission, is frequently cited as a measure of operational efficiency in hospitals.[1–3] These two indicators have proved immensely useful for assessing levels of efficiency in allocating hospital resources, quality control, and hospital management. In an environment where numerous factors, such as an increase in average life expectancy, the phenomenon of aging in the population and the accompanying chronic ailments,[4–10] new and expensive medical technologies, and scarcity of hospital beds[11,12] have already put a heavy burden on limited health care resources, including hospitals, it is considered mandatory to optimize use of hospital beds through shifting services from inpatient to outpatient and preventing inappropriate stays at hospitals.[2,13]

Patient's appropriate stay at hospital refers to those stays during which the patient requires medical attention, nursing care, and drug therapy that cannot be provided outside hospital settings, otherwise it is inappropriate.[14–15] Inappropriate days of hospitalization tend to unnecessarily raise hospitalization expenses, waste hospital resources, and limit the availability of optimal care. This trend is, specifically, considerable in public sector hospitals, which have a fixed budget line with which to provide their services.[16] In Iran, 76% of total hospital beds belong to the public sector and are financed through central government allocated budgets.[17,18]

The rates of appropriate admissions and stays at the hospitals vary significantly among countries, based on hospital providers and commissioners.[2,15,19–24] Numerous studies have recommended approaches to decrease LOS and many of these recommendations have been applied to hospital settings. Some countries with high socio-economic status have been shifting their inpatient services toward outpatient and home-based palliative care, in an effort to lower length of hospital stay, and henceforth curb treatment expenses.[14,15,25,26]

According to a report published in 2007, patterns of mortality and morbidity in Iran are becoming exponentially complex, highlighting the need to pay due attention to the existing structure and the scarcity of resources available to the health care system. Optimizing health care delivery systems, particularly in hospitals, through reducing the use of inpatient hospital services by reducing

Authors' affiliations: [1]Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran, [2]Ministry of Health and Medical Education, Tehran, Iran
•Corresponding author and reprints: Ahmad Afzali MD, Shariati Hospital, Tehran University of Medical Sciences, North Kargar Avenue, Jalal Al Ahmed Street, Tehran, Iran. Tel: +98-21-84901, E-mail: aaaafzali@gmail.com
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admissions, length of stay, or both, is considered the main strategy to achieve this goal.[10]

Relative shortages in medical institutions, specialized medical services, trained manpower, especially hospital nurses, and medical equipment[10,27] have necessitated the study of LOS in hospitals, and analysis of the most important factors affecting them. The results of such studies can be helpful in designing new tools or refining the existing ones in order to optimize LOS in Iranian hospitals.

The aim of the current study is analyzing patients' LOS in medical and surgical wards of a government-owned, educational hospital in Iran, and detecting the factors affecting these stays. The results of this study will potentially shed light on the factors affecting length of hospital stay in the local settings and be of assistance for policy setting in Iranian hospitals.

Materials and Methods

Design and Settings

A prospective cross-sectional study was conducted in a general hospital affiliated with the Tehran University of Medical Sciences which is one of the most reliable teaching and referral centers in the country. The hospital has 800 beds in medical, surgical and critical care wards, with roughly 20,744 patients admitted and 20,732 discharged annually. The medical and surgical wards consist of cardiology, pulmonary, nephrology, gastrointestinal, endocrine, neurology, rheumatology, hematology and oncology, urology, maxillofacial, orthopedic, general surgery, and neurosurgery. The average occupancy rate of beds in this hospital is approximately 83.8%. Patients are admitted in medical and surgical wards, a) via emergency medical services /emergency department or b) by the affiliated out-patient clinics of the hospital.

The academic staff regularly visit the medical and surgical wards in morning shifts, and are on-call during evening and night rounds; the lion's share of medical care is delivered by the fellows, residents and interns under the supervision of on-call academic staff.

Data collection

The appropriateness of admissions and LOS of 1,815 patients admitted to 13 medical and surgical wards (with a total of 375 beds) was assessed using the Appropriateness Evaluation Protocol (AEP).[28] AEP is a tool developed in the USA, and has been adjusted and validated in many other countries,[14,15,29,30] including Iran.[22,24,31] AEP can be used for all sorts of medical specialties with the exception of labor and delivery.

The tool consists of two main sections. The first section includes 18 criteria which assess the appropriateness of admissions of patients in the hospital. In this section, the necessity for admission of patients is evaluated.

The second section, with its 26 criteria (US-AEP), evaluates the appropriateness of days of stays in hospital wards, based on the medical services, nursing care provided, and patients' clinical conditions with 11, 7 and 8 criteria, respectively.[28]

If only one criterion is present, the hospital admission and hospital stays are considered as appropriate.

Validity was assessed by 10 faculty members, and the questionnaire was adjusted according to their comments. Inter-rater (inter-observer) reliability was checked after a pilot study with 20 patients, with a Kappa value of 0.72.

The study included all patients admitted to the hospital's 13 medical and surgical wards during four months in 2013. Five nurses trained in AEP management collected data by reviewing patients' medical records. Expert opinion was sought from ward staff, if necessary. The variables studied were as follows: date of admission, ward, age, sex, medical insurance provider, route of admission, prior history of hospitalization, and the specific criteria embedded in the AEP. Appropriate admission criteria were tested within 24 hours of patients' admission and appropriateness of stays was examined during the hospitalization period. If at least one criterion in each section of the AEP were met, the admission and hospital stay would be considered as appropriate; otherwise, the admission and days of the stay would be regarded as inappropriate, and, subsequently, the reasons for inappropriateness would be recorded.

Statistical analysis

A descriptive analysis of the variables was carried out and the rate of inappropriate hospital admission and days of stays were computed.

Qualitative evaluation

After reviewing the results, a qualitative approach was used to explore the factors affecting hospital stay. The purposeful sample of 14 health professionals working in medical and surgical wards (Table 1) participated. Data were collected through semi-structured interviews. Some interview questions were as follows:

1) What are the major reasons for inappropriate hospital stay?
2) Explain the situations where hospital stays were inappropriate.
3) Which strategies do the hospital managers use for dealing with inappropriate hospital stay?

Data were analyzed with inductive content analysis methods.[32] So, audio recordings of the interviews were transcribed and reviewed several times and were coded line by line to achieve the subcategories and categories.

Ethical Consideration

This research was completed by the financial support of the Tehran University of Medical Sciences (TUMS). The participants were briefed about the aims of the study, and interviews were conducted after obtaining consent.

Table 1. Participants characteristics (interviewees)

Participants Characteristics	Range of Age	Average of experience
3 physicians	50–45	12 years
4 head nurses	52–40	20 years
2 supervisor	44 and 46	14 years
5 ward nurses	42–25	7 years

Table 2. Characteristics of the patients

	Medical	Surgical	Total
	N = 982	N = 833	N = 1815
Sex			
Male	477 (48.6)	363 (43.6)	840 (46.3)
Female	505 (51.4)	470 (56.4)	975 (53.7)
Age (years)*	52.44 (18.63)	43.78 (16.49)	48.56 (18.22)
Age group			
≤ 40	282 (29.1)	355 (45.7)	641 (36.5)
60–41	342 (35.3)	283 (36.4)	628 (35.8)
> 60	345 (35.6)	139 (17.9)	485 (27.7)
Type of admission			
Emergency	570 (61.6)	256 (34.5)	826 (49.6)
Elective	356 (38.4)	485 (65.5)	841 (50.4)
Day of admission			
Week-day	797 (83.0)	618 (79.2)	1417 (81.2)
Week-end	163 (17.0)	162 (20.8)	328 (18.8)
History of hospitalization			
Yes	627 (67.3)	205 (27.6)	832 (49.7)
No	305 (32.7)	538 (72.4)	843 (50.3)
Length of stay(days)*	9.40 (7.68)	6.30 (5.66)	7.98 (7.00)
Length of stay			
≤ 5	360 (36.7)	478 (57.4)	838 (46.2)
> 5	622 (63.3)	355 (42.6)	977 (53.8)
Hospital admission			
Appropriate	940 (95.7)	721 (86.6)	1661 (91.5)
Inappropriate	42 (4.3)	112 (13.4)	154 (8.5)

Values are numbers and percentages, except for * where mean (SD) is provided.

Results

An overall number of 1,815 patients, 982 in medical and 833 in surgical wards were admitted to the hospitals during the four-month period of the study. The total hospital stay of patients was 12,629 days, of which 81,94 days were in medical and 4,435 days were in surgical wards.

Characteristics of the patients

As shown in Table 2, 53.7% of patients were female and the mean age of the patients was 48.56 years. In general, the mean age of patients in the medical wards was higher than the mean age of patients in the surgical wards. In the medical wards, 35.6% of the patients were over 60 year's age. In the surgical wards, 45.7% of the patients were under 40 years.

In the medical wards, 61.6% of the patients had been admitted because of their urgent medical conditions while in the surgical wards, 65.5% of patients were electively hospitalized. In medical wards, 67.3% of patients had a prior history of hospitalization, whereas in surgical wards, this figure was as low as 27.6%.

Hospital admission based on the patients

Whiles in surgical wards, 13.4% of hospital admissions were inappropriate, it was 4.3% in medical wards. Overall, 8.5% of patients did not meet the admission criteria (Table 2).

Hospital stay based on the patients

The mean of hospital stay in medical wards (9.4 day) was greater than that of the surgical wards (6.3 day) and 63.3% of patients in medical wards were hospitalized longer than 5 day (Table 2).

Hospital stay based on the days

Totally, 12,629 hospital days were assessed, of which 428 days (3.4%) were inappropriate. In medical wards, 3.1% and in surgical wards, 3.9% of hospital stays were inappropriate (Table 3).

Table 3 also shows the most common causes of appropriate hospital stays. The leading cause, classified in the AEP as "Parenteral therapy - intermittent or continuous IV fluid with any supplementation (IV administration of fluids and/or nutrition)" resulted in 9,986 days of stay. Other important causes of hospital stays in the category of receiving nursing services are as follows: 1) Intramuscular and subcutaneous injections at least twice daily; 2) Close medical monitoring by a nurse, at least three times daily, under physician's orders; 3) Intake and output measurements; 4) Respiratory care: intermittent or continuous respirator use and/or inhalation therapy; and 5) Major surgical wound and drainage care.

The four major medical services which accounted for appropriate days of stay were 1) New or experimental treatment requiring frequent dose adjustments under direct medical supervision; 2) Major invasive procedure(s) within the past 24 h; 3) Condition requiring close medical monitoring by a doctor at least 3 times a day; and 4) Patient scheduled for procedure in operating room the next day, requiring extraordinary preoperative consultation.

Table 3 also shows that patients stayed in hospital for 706 days, merely to receive medical services, and 4,625 days to receive nursing care only.

Table 3. hospital stay based on the days

Criteria	Services	Number of days*		
		Medical	Surgical	Total
		8194	4435	12629
Hospital stay(days)				
Appropriate		7940 (96.9)	4261 (96.1)	12201 (96.6)
Inappropriate		254 (3.1)	174 (3.9)	428 (3.4)
The most common criteria in hospital stay				
Parenteral therapy: intermittent or continuous IV fluid with any supplementation (IV administration of fluids and/or nutrition.	Nursing	6444	3542	9986
Intramuscular and subcutaneous injections at least twice daily.	Nursing	3087	1010	4097
Close medical monitoring by a nurse at least three times daily under physician's orders.	Nursing	2363	910	3273
New or experimental treatment, requiring frequent dose adjustments under direct medical supervision.	Medical	2584	648	3232
Intake and output measurements.	Nursing	2215	465	2680
Respiratory care: intermittent or continuous respirator use and/ or inhalation therapy.	Nursing	2361	162	2523
Major surgical wound and drainage care.	Nursing	735	1120	1855
Major invasive procedure within the past 24 h.	Medical	1177	569	1746
Condition requiring close medical monitoring by a doctor at least 3 times daily.	Medical	1378	352	1730
Scheduled for procedure in operating room the next day, requiring extraordinary preoperative consultation.	Medical	497	854	1351
Exclusive causes of appropriate hospital stays				
Need to Medical Services		458 (5.4)	248 (6.0)	706 (5.6)
Need to Nursing Services		2924 (34.5)	1701 (41.0)	4625 (36.6)
Patients condition		14 (0.2)	5 (0.1)	19 (0.2)
Need to Medical Services/ Need to Nursing Services/ Patients condition		5086 (60.0)	2193 (52.9)	7279 (57.6)

Values are numbers and percentages, except for * where mean (SD) is provided

Causes of inappropriate hospital days of stay

Table 4 indicates that Planning/ Procedures/ Personnel factors (77.3%), as well as patients' conditions (22.7%) were the main causes of inappropriate stays.

Qualitative findings

The quotes from participants are shown in Table 5. Availability of suitable facilities and modern equipment, and recent reforms implemented in the studied hospital, in addition to the hospital's proximity to specialized diagnostic centers, contributed to the relatively high rates of appropriate hospital stay (Table 5 quotes 1, 2, and 3).

The factors which accounted for inappropriate stays were quoted as incoordination of professional groups, residents' regular rotations/ rotation of residents and other wards, and lack of complementary care (Table 5 quotes 4, 5, 6, and 7).

Discussion

In the current study, inappropriate admission rate in medical and surgical wards was 8.5%. This rate has been reported with great variation in different studies: 19%[33] to 27.6% in Spain (1996),[34] 23% in the United States (1986),[35] 14.2% in Italy (2000),[30] and 1% in England (1994).[26] The inappropriate admission rate for medical wards in Switzerland (1997) was reported as 15.2%,[36] and for medical emergency wards in England (2001) as 28%.[37] Inappropriate admission rate has been reported as 8.2% in Taiwan (2005),[19] and as 6%, 7%, and 7.4% for Iran, according to various studies.[22,24,38] Variable rates of inappropriate admission reflected in different studies may be attributed to various methods of admission in educational centers, geographical region of institutions, and bed occupancy ratios.[22] However, other factors such as insufficiency of providing services at lower levels of health care system, patients' self-referral to hospitals, and not conducting diagnostic tests outside the hospital, have been also noted as other possible causes of inappropriate admissions.[22,24,30,39]

In this study, average LOS was 9.4 and 3.6 days in medical and surgical wards, respectively. In total, 12,629 days of stay were studied of which 3.4% were inappropriate. Other studies, reviewing the situation in Iranian hospitals, have reported inappropriate hospital stay as 6.2%, 8.6%, and 22.1%.[22,24,31,38] In other countries, this rate varies between 20% and 44.6%.[14,15,20,30,40,41]

Patients, personnel, planning, place, and product (the five "P"s) have been mentioned as critical factors affecting inappropriate length of stay.[14]

Also, inappropriate LOS has been attributed to two sets of intra- and extra-organizational factors. Extra-organizational factors include absence of volunteer aid, shortage of primary health services, and absence of options to transfer to other care facilities. Some of the intra-organizational factors are delays in discharge planning, inefficiencies or delays in diagnosis and treatment, and in accessing results of diagnostic tests.[15] The reported results of inappropriate admissions and stays are affected by several other factors, including prevalence of a certain disease in the population, patients' characteristics, availability of medical care and services, situation of health care provision, behavioral patterns and attitudes

Table4. Causes of inappropriate hospital days of stay

Causes	The potential causes categories*	Days (%)
Drug Preparation	Patients condition	20 (4.7)
Cancellation of surgery	Planning/Procedures/ Personnel	63 (14.7)
Unavailability of physicians/No consensus between physicians	Personnel	141 (32.9)
Patients waiting for: clinical/paraclinical procedures ; Results of lab tests	Planning/Procedures	127 (29.7)
Homeless/Aging/ Forlorn	Patient condition	77 (18.0)
*Based on Panis and colleagues[14]		

Table 5. Quotes from Participants

1	Operational plans issued by the hospital deputy for treatment and exercised by the wards, are mainly preventative strategies. We monitor and control these plans. We also train our staff accordingly. (supervisor)
2	We have a vast array of in-house specialty equipment and facilities. Even if there is any shortage, our neighboring centers will always be at our immediate disposal. That's why patients' turnover is so fast and smooth here. (physician)
3	Patients' consultation follow-up unit is really helpful; it tracks every single consultation and informs the physician in charge. (head nurse)
4	Frequently, there's disagreement among professional groups, or their communications are flawed. For instance, surgeons may disagree with internists, and the patients have to stay until the situation is resolved. (supervisor)
5	Rotation of residents, particularly in medical wards, also rotations of first-year residents is troublesome; since they're not familiar with the ward's procedures, it will take time for them to adjust. (head nurse)
6	Many patients stay in the wards just to receive palliative care which can be basically delivered to them at their homes. Unfortunately, due to the lack of palliative care services for the outpatients, they have to seek help from inside the hospitals. (ward nurse)
7	Many patients return to the hospital after being discharged. We don't have a proper patient monitoring system in place and post discharge. (physician)

of physicians and patients, hospital procedures, purposes of the studies, and the method of study.[24,30]

The current study was conducted in an educational hospital located in the capital of the country. The qualitative study done to analyze conditions and factors affecting patients' LOS showed that a multitude of factors contributed to lowering inappropriate length of stay: hospital government ownership, routine admission of patients referred from across the country, availability of subspecialists' medical services, high rate of admission of acutely ill and senile patients, the long waiting list for hospital beds, allocation of a fixed number of beds to each medical attendant, presence of a bed management unit, fully equipped radiology unit with round-the-clock CT and MRI services, a state-of-the-art medical laboratory, easy access to other public and private medical centers, consultations follow-up unit, on-site consulting physicians in the fields of ENT, ophthalmology, dermatology, psychiatry, and infectious diseases, seven days a week active clinics, standing protocols for admission and hospitalization of oncologic and hematologic patients, and regular visits of all patients in teaching rounds by experienced attendants. As mentioned, the average LOS varies substantially by hospital providers and commissioners.[2]

The results of this study also showed that the need to receive nursing services is one of the most significant causes of patients' stay in the hospital. It was obvious that due to the lack of an efficient system of palliative care in the country, some patients, including those in need of end-of-life care, have no other option than seeking help in inpatient settings. As such, founding a comprehensive palliative and home care system in the country will be a firm first step toward lowering unnecessary length of stay in hospitals and optimizing resource usage, since access to home care has inverse correlation with the length of hospital stay.[14]

The results indicated that a fraction of the hospitalized patients had indeed stayed in the hospital previously and since, except for some conditions, there is no system for keeping track of discharged patients, it seems necessary to implement plans to monitor discharged patients in order to prevent inappropriate re-admissions.[2] According to some studies, interventions during and after the patients' discharge, as well as the clinical practice guidelines, would improve the appropriateness of length of stay. Such strategies should be defined in accordance with hospitals' specific needs and patients' characteristics.[2] Making appropriate use of these strategies can be helpful in Iran.

The current study was conducted in a single, educational, referral hospital. In order to deepen and strengthen the results of this study, further multi-institutional studies are required to analyze and compare approaches to lowering length of stay.

Limitation

Because of the educational nature of the hospital in the current study, frequent rotation of residents led to re-ordering the orders for diagnostic tests. As a result, some patients stayed longer than they were supposed to be. Thus, these patients' additional stays seemed appropriate according to their physicians' orders in which they had required the tests or medical attention.

In conclusion, the results of the current study are indicative of considerable inappropriate admissions in medical and surgical wards. Obviously, inappropriate admissions will result in unnecessary hospital stays. Organizing a nationwide system of home and palliative care, and devising and executing evidence-based admission protocols, can minimize inappropriate admissions to the hospital.

Factors pertaining to procedures, personnel, and patients led to inappropriate stays in the studied hospital. To lift this burden,

the main focus of hospital managements should be developing guidelines for appropriate stays, and coordination of physicians and other key personnel. As the results have illustrated, structural reforms at the hospital level, improvements in clinical governance and accreditation system have positively affected management of hospital beds and caused a significant decrease of unnecessary stays.

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