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Evaluation of Performance Indicators and Frequency of Patient Referrals in the Hospitals Affiliated to Babol University of Medical Sciences in 2013

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ABSTRACT

BACKGROUND AND OBJECTIVE: Performance indicators are important tools for the planning, organization, and coordination of hospital services in geographical regions and utilization of medical facilities within the covered populations. This study aimed to evaluate performance indicators and frequency of patient referrals in the hospitals affiliated to Babol University of Medical Sciences, Iran in 2013.

METHODS: In this retrospective study, data of 9, 513 patients admitted to the hospitals affiliated to Babol University of Medical Sciences were extracted from medical records using a systematic random approach in 2013. Evaluation of the collected data was performed using the standard forms of the Iranian Ministry of Health and Medical Education.

FINDINGS: In this study, Ayatollah Rohani Hospital had the highest bed occupancy rate (BOR) (82%), while Shahid Rajayi Hospital had the lowest BOR (55%). Mean age of the referred patients to the evaluated hospitals was 40.61±23.56 years. In addition, 26.4% of the patients were residents outside Babol city at the time of the study. The majority of these patients (79.4%) referred to Shahid Rajayi Hospital, while the lowest rate of referrals was reported in Shahid Yahyanejhad Hospital (8.7%). Moreover, a significant difference was observed between the mode of discharge and type of insurance of the patients (p=0.000). However, no significant difference was found in the mode of referral to the hospitals.

CONCLUSION: According to the results of this study, a significant proportion of patient referrals to the hospitals affiliated to Babol University of Medical Sciences were from the towns and villages in the vicinity of Babol city. Therefore, it is recommended that the Ministry of Health and Medical Education allocate the required budget to provide necessary facilities and equipment in these healthcare centers.

KEY WORDS: *Bed occupancy rate, Budget, Hospital, Performance indicators, Referrals.*

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Introduction

Hospital indicators represent the performance of healthcare centers and are the most important tools to measure the efficiency of hospital services (1-3). Performance indicators are used for the planning, organization, and coordination of hospital services in geographical regions and utilization of medical facilities within the covered populations (4). The most important hospital performance indicators are bed occupancy rate (BOR), bed occupancy ratio, bed turnover interval, average length of hospital stay, and ratio of deceased patients to admitted patients (3, 5-7). In recent years, decision-making authorities have been concerned about factors such as changes in the pattern of diseases, increasing hospital costs, rapid advancement in technology and hospital equipment, and high public expectations (8).

Amongvarious components of the healthcare system, hospital services account for the highest growth of expenses (9). As such, healthcare providers are expected to promote their performance in order to offer efficient services (10). Hospital admission is influenced by several factors, such as the insurance type, income status, age, gender, education level, marital status, overall health status, severity of disease, and race of the patients (11). Previous studies have proposed various influential factors with respect to the choice of healthcare providers by patients. For instance, Toyabe assessed the effect of family income status and hospital service costs (12), while Nasiripour et al. evaluated the role of quality and cost of services in selecting healthcare centers (10).

In addition, Heller has noted the significance of distance from medical services (13), and Merle et al. has pointed out the role of quality of services in the selection of healthcare providers (14). With the exception of the patients who are referred to the nearest hospital in emergency, other patients pay special attention to the selection of the most efficient healthcare center, especially in case of surgery, which is considered an extremely sensitive condition (15). In one study, Habtom et al. claimed that the most important influential factors in the selection of a hospital are the education level, quality of care, income status, severity of disease, social status, and residence of the patient (16).

Hospitals affiliated to Babol University of Medical Sciences are considered as the most important clinical referral centers for patients living in the towns and villages near Babol city, especially the residents of the west of this province.

These hospitals enjoy the expertise of experienced physicians, as well as the most advanced technologies available for different medical conditions. This study aimed to evaluate the performance level of the hospitals affiliated to Babol University of Medical Sciences and identify the health status of the referred patients.

Methods

This retrospective study was conducted in the healthcare centers affiliated to Babol University of Medical Sciences, including Ayatollah Rohani Hospital, Shahid Beheshti Hospital, Shahid Yahyanejhad Hospital, Amirkola Children's Hospital, Shahid Rajayi Hospital, and Babol Clinic private hospital in 2013. Required data were collected using 1-201 standard form of monthly hospital activities and standard admission checklist of the Iranian Ministry of Health and Medical Education.

These forms consist of data such as the name of the hospital, demographic characteristics of patients, place of birth, place of residence, ward of admission, type of insurance, mode of referral, history of hospitalization, number of admissions, primary and secondary diagnoses, paraclinical proceedings, medical consultation, and health status of the patients. Sample population of the study included all the admitted patients to the hospitals affiliated to Babol University of Medical Sciences in 2013. For data collection, we extracted the medical records of the patients from hospital archives (n=1,098) using a 0/1 systematic random approach.

Eventually, legible and complete data extracted from 9,513 records were assessed in this study. Data obtained from the second questionnaire were analyzed in SPSS 16 using one-way analysis of variance (ANOVA), one-sample T-test, and Chi-square, and $p<0.05$ was considered significant.

Results

In this study, Ayatollah Rohani Hospital had the highest BOR (82%), and Babol Clinic private hospital had the lowest BOR (50%). In addition, the highest rate of hospital stay was reported in Amirkola Children's Hospital (4.4 days), while the lowest rate of hospital stay was observed in Babol Clinic private hospital (2.1 days) (table 1). Out of 9,513 patient referrals, 4,871 cases (51.2%) were male, and 4,642 cases (48.8%) were female. With regard to marital status, 23% of the samples were single, and 77% were married. Mean age of the hospital referents was 40.61±23.56 years. In 41.4% of the cases, patients had referred to the hospital by themselves, while 56.5% were referred by other people, 1.6% were brought in by an ambulance, and 0.5% were transferred from other health care centers.

Approximately 35.6% of the studied patients had no history of hospitalization, while 16.74% were hospitalized once, 0.19% were admitted twice, 3.3% were hospitalized three times, and 6.3% were admitted more than three times in the hospitals affiliated to Babol University of Medical Sciences. According to our findings, radiography was prescribed for 37% of the admitted patients, and 59.2% needed laboratory examinations. During hospitalization, 10.9% of the

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admitted patients required medical consultation once, 3.1% twice, and 2.6% more than twice (table 2).

Table 1. Status of performance indicators in hospitals affiliated to Babol University of Medical Sciences (2013)

Healthcare Center / Performance Indicator	Ayatollah Rohani	Shahid Beheshti	Shahid Yahyanejhad	Amirkola Children's	Shahid Rajayi	Babol Clinic Private
Active Bed	365	177	172	133	22	116
Bed Occupancy Rate (BOR) (%)	82	79.9	69	77	55	50
Bed Turnover (N)	77.4	68.8	58.82	63.67	37.36	88.42
Bed Turnover Interval (day)	0.9	1.1	2.13	1.33	5.73	2.04
Average Length of Hospital Stay (day)	3.9	4.2	4.3	4.4	4	2.1

Table 2. Frequency of demographic characteristics and healthcare measures in hospitals affiliated to Babol University of Medical Sciences(2013)

Healthcare Center	Ayatollah Rohani N(%)		Shahid Beheshti N(%)		Shahid Yahyanejhad N(%)		Amirkola Children's N(%)		Shahid Rajayi N(%)		Babol Clinic Private N(%)		Total N(%)		P-value
Gender N (%)	Male 974(39.2)	Female 1508(60.8)	Male 2198(61)	Female 1406(39)	Male 483(44.5)	Female 603(55.5)	Male 449(58.8)	Female 315(41.2)	Male 111(49.8)	Female 112(50.2)	Male 656(48.4)	Female 698 (51.6)	Male 4871(51.2)	Female 4642(48.8)	0.026
Marital Status	Single 188(7.7)	Married 2269(92.3)	Single 720 (20)	Married 2884 (80)	Single 720(18.9)	Married 878(81.1)	Single 764 (100)	Married 0(0)	Single 19(8.5)	Married 204(91.5)	Single 283(20.9)	Married 1071(79.1)	Single 2178 (23)	Married 7306 (77)	0.000
Permanent Place of Residence	Babol 1877(75.6)	Other 605(24.4)	Babol 2859(79.3)	Other 745(20.7)	Babol 992(91.3)	Other 94(8.7)	Babol 459(60.1)	Other 305(39.9)	Babol 46(20.6)	Other 177(79.4)	Babol 764(56.4)	Other 590(43.6)	Babol 6997(73.6)	Other 2516(26.4)	0.000
Place of Birth	Babol 1971(79.4)	Other 511(20.6)	Babol 2905(80.6)	Other 699(19.4)	Babol 992(91.3)	Other 94(8.7)	Babol 451(59)	Other 313(41)	Babol 52(23.3)	Other 171(76.7)	Babol 767(56.6)	Other 587(43.4)	Babol 7138(75)	Other 2375(25)	0.000
History of Hospitalization	No 512(20.6)	Yes 1970(79.4)	No 2792(77.5)	Yes 812(22.5)	No 887(81.7)	Yes 199(18.3)	No 580(75.9)	Yes 184(24.1)	No 192(86.1)	Yes 31(13.9)	No 1163(86.1)	Yes 188(13.9)	No 6126(64.4)	Yes 3384(35.6)	0.000
Laboratory Examinations	No 505(20.5)	Yes 1954(79.5)	No 2257(62.6)	Yes 1347 (37.4)	No 451(43.4)	Yes 589(56.6)	No 23(3)	Yes 223(97)	No 0(0)	Yes 223(100)	No 609(45.4)	Yes 732(54.6)	No 3845(40.8)	Yes 5586(59.2)	0.337
Radiography	No 1296(53)	Yes 1151(47)	No 2617(72.6)	Yes 987 (27.4)	No 750(72.7)	Yes 282(27.3)	No 405(53)	Yes 359(47)	No 0(0)	Yes 223(100)	No 859(64.2)	Yes 479 (35.8)	No 5927(63)	Yes 3481(37)	0.035
Medical Consultation	No 1920(77.4)	Yes 562(22.6)	No 3320(92.1)	Yes 284 (7.9)	No 949 (87.4)	Yes 137 (12.6)	No 629 (82.4)	Yes 134 (17.6)	No 2220 (99.6)	Yes 1(0.4)	No 891 (65.8)	Yes 463 (34.2)	No 7931(83.4)	Yes 1581(16.6)	0.000

The majority of the referrals (73.6%) to the hospitals affiliated to Babol University of Medical Sciences were from Babol city, followed by other towns, including Babolsar, Amol, Ghaem Shahr, Fereyduon Kenar, Mahmuod Abad, and Noor, respectively (table 3). In addition, the highest number of patient referrals from outside Babol city was reported in Shahid Rajayi Hospital, Amirkola Children's Hospital, and Babol Clinic private hospital, respectively (Fig 1). Our results indicated that the majority of the referred patients (96.1%) were discharged after complete recovery, while 3% were released with personal consent, and 0.1% were transferred to other healthcare centers. Mortality rate of the referred patients was estimated at 0.1% before 24 hours of admission, and 0.7% after 24 hours of admission. On the other hand, some of the patients had to be referred repeatedly due to their special conditions (e.g., cancer), and a significant difference was observed between the mode of discharge and type of insurance ($p<0.001$). However, no significant difference was observed in the mode of referral among the study samples (table 4). Based on the International Classification of Diseases (ICD-10), general damages, intoxication, and other consequences of external factors were the most common causes of hospitalization in the evaluated healthcare centers (table 5).

Table 3. Frequency and percentage of patient referrals from different towns and provinces (based on permanent place of residence) to hospitals affiliated to Babol University of Medical Sciences (2013)

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Province	Town	N(%)
Mazandaran	Babol	6997 (73.6)
	Babolsar	683 (7.2)
	Fereyduon Kenar	168 (1.8)
	Amol	535 (5.6)
	Sorkhrood	5 (0.1)
	Mahmuod Abad	140 (1.5)
	Noor & Rooyan	132 (1.5)
	Noshahr	72 (0.8)
	Chaloos	29 (0.3)
	Tonekabon & Ramsar	34 (0.3)
	simoorgh	36 (0.4)
	Behnamir	33 (0.3)
	Jooybar	46 (0.5)
	Ghaem Shahr	352(3.7)
	Savadkooh	41 (0.4)
	Sari	79 (0.8)
	Neka	17 (0.2)
	Behshahr	27(0.3)
Tehran	Tehran, Damavand, Firoozkooh	15(0.2)
Golestan	Gorgan, Kordkooy, Ali Abad Katool, Gonbad	17 (0.2)
Semnan	Semnan & Shahrood	3 (0.1)
Khorasan	Mashhad & Sabzevar	8 (0.1)
Other	—	18 (0.2)
Unknown	Unknown	26 (0.3)

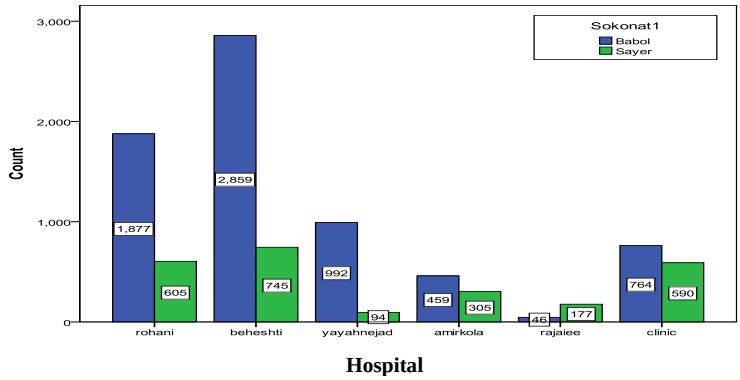

Figure 1. Frequency of patient referrals in hospitals affiliated to Babol University of Medical Sciences in terms of place of residence (2013)

Table 4. Correlation between demographic characteristics and place of residence of patients referred to hospitals affiliated to Babol University of Medical Sciences (2013)

Variable	City/Town	Babol N(%)	Other N(%)	Total N(%)	P-value
Age (year)	0-15	999(14.3)	491(19.6)	1490(15.7)	0.005
	16-40	2580(37)	792(31.6)	3372(35.5)	
	41-64	2081(29.8)	779(31.1)	286(30.1)	
	65-99	1320(18.9)	446(17.8)	1766(18.6)	
Gender	Male	3569(51)	1302(51.7)	4871(51.2)	0.530
	Female	3428(49)	1214(48.3)	4642(48.8)	
Marital Status	Single	1536(25.6)	642(22)	2178(23)	0.000
	Married	5438(74.4)	1868(78)	7306(77)	
Mode of Referral	Self-transfer	2881(41.3)	1041(41.4)	3922(41.4)	0.858
	Transfer from Other Hospitals	30(0.4)	14(0.6)	44(0.5)	
	Ambulance	134(1.9)	15(0.6)	149(1.6)	
	By Other People	3920(56.2)	1440(57.3)	5360(56.5)	

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Mode of Discharge	After Recovery	6634(94.9)	2278(90.6)	8912(93.8)	0.000
	Transferred	8(0.1)	0(0)	8(0.1)	
	Personal Consent	244(3.5)	45(1.8)	289(3)	
	Death before 24 Hours	10(0.1)	2(0.1)	12(0.1)	
	Death after 24 Hours	47(0.7)	16(0.6)	63(0.7)	
	Under Treatment	45(0.6)	174(6.9)	219(2.3)	

Table 5. Ranking of frequency of final diagnosis in patients referred to hospitals affiliated to Babol University of Medical Sciences based on International Classification of Diseases (ICD-10)(2013)

Rank	Number of Patients/ Diagnosis	Babol City N(%)	Other N (%)	Total
1	Damage, intoxication, and other consequences of external causes	1693(24.2)	335(13.3)	2028(21.3)
2	Symptoms, signs, and abnormal clinical and laboratory results	882(12.6)	253(10.1)	1135(11.9)
3	Circulatory system diseases	722(10.3)	212(8.4)	934(11.9)
4	Factors influencing health status/contact in healthcare centers	531(7.6)	190(7.6)	721(7.6)
5	Gastrointestinal diseases	485(6.9)	213(8.5)	698(7.3)
6	Genital and urinary tract diseases	455(6.5)	236(9.4)	691(7.3)
7	Pregnancy, childbirth, and postpartum complications	503(7.2)	135(5.4)	638(6.7)
8	Neoplasms	233(3.3)	307(12.2)	540(5.7)
9	Respiratory disorders	218(3.1)	112(4.5)	330(3.5)
10	Certain infectious and parasitic diseases	147(2.1)	89(3.5)	236(2.5)
11	Disorders of musculoskeletal system and connective tissue	174(2.5)	53(1.2)	227(2.4)
12	Nervous system diseases	114(1.6)	44(1.7)	158(1.7)
13	Eye disorders and related health problems	87(1.2)	44(1.7)	131(1.4)
14	Skin and subcutaneous tissue diseases	86(1.2)	16(0.6)	102(1.1)
15	Internal, nutritional, and metabolic endocrine diseases	61(0.9)	24(1)	85(0.9)
16	Disorders of blood and blood-forming organs/Certain immune mechanism disorders	44(0.6)	29(1.2)	73(0.8)
17	Congenital malformations, deformities, and chromosomal abnormalities	33(0.5)	20(0.8)	53(0.6)
18	Certain conditions originating in the perinatal period	26(0.4)	11(0.4)	37(0.4)
19	Mental and behavioral disorders	19(0.3)	15(0.6)	34(0.4)
20	Diseases of the ear and mastoid process	5(0.1)	13(0.5)	18(0.2)
21	External causes of morbidity and mortality	9(0.1)	5(0.2)	14(0.1)
22	Unknown	470(6.7)	160(6.4)	630(6.6)
Total		6997(100)	2516(100)	9513(100)

P=0.000

Discussion

According to the results of the present study, Ayatollah Rohani Hospital had the highest BOR (82%), while the lowest BOR was reported in Babol Clinic private hospital (50%). Among the evaluated healthcare centers, the highest length of hospital stay was observed in Ayatollah Rohani Hospital (3.9 days), while the shortest length of hospital stay was reported in Babol Clinic private hospital (2.1 days). Based on the standards of the Iranian Ministry of Health and Medical Education, the most suitable BOR and length of hospital stay are 70% and 3.5 days, respectively (3). In one study by Ramos et al., BOR was reported to be lower in small hospitals compared to major referral hospitals.

Furthermore, it was stated that BOR and bed turnover rate tend to be higher in teaching hospitals (17). In another study by Younsi et al., mean length of hospital stay was found to be significantly lower in private hospitals compared to general hospitals (18). Findings of the current study indicated that 51.2% of the patients referred to the hospitals affiliated to Babol University of Medical Sciences were male, and 48.8% were female. This is consistent with the results obtained by Usman et al. (19), Amaral et al. (20), and Nobili et al., who reported that women accounted for higher referral rates (21).

In the present study, a significant difference was observed in the rate of patient referrals in terms of gender, which could be due to the fields of specialty

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and number of wards allocated to each gender in the evaluated healthcare centers. According to the results of the current study, rate of discharge with the personal consent of patients was 3% in the hospitals affiliated to Babol University of Medical Sciences, while this rate was reported to be 3.3% in the study by Toolaie et al. (22), 2.2% in the study by Kabirzade et al. (23), and 8.21% in the study by Vahdat et al. (24). Different factors could be involved in the discharge of patients with personal consent, including the dissatisfaction with medical services, insufficient medical equipment or nursing services, lack of facilities and suitable environment, high hospital costs, and admission in teaching hospitals. On the other hand, it seems that the low rate of discharge with the personal consent of patients in the hospitals affiliated to Babol University of Medical Sciences is due to the provision of high-quality services, adequate equipment, and constant presence of the physicians and specialists in these healthcare centers. Most importantly, this could be due to the fact that all these hospitals are major referral centers in the region. In the current study, rate of discharge with personal consent was lower in the patients referred from the towns and villages in the province (1.8%) compared to those living in Babol city. This could be due to the fact that residents of other towns in the province have confidence in the medical services offered by the referral hospitals affiliated to Babol University of Medical Sciences.

Our findings indicated that 93.8% of the admitted patients were discharged after complete recovery, 0.1% were transferred to other healthcare centers, and 0.8% were deceased. In the research by Nobili et al., 86% of the studied patients were discharged after partial recovery, 9.5% were transferred to more equipped healthcare centers, and 4.5% were deceased (21). According to the findings of Ramos et al., mortality rate was lower in the hospitals providing specialized services compared to smaller healthcare centers (17).

Since patients are commonly referred from other towns to the affiliated hospitals as major referral centers, the rates of mortality (0.8%) and patient transfer to other healthcare centers were relatively low in the present study. Furthermore, our results indicated that 35.6% of the patients had a history of hospitalization, the rate of which was estimated at 79.4% in Ayatollah Rohani Hospital. This could be due to the fact that Ayatollah Rohani Hospital offers specialized services in different internal medicine wards, which benefits elderly patients with chronic diseases. Moreover, this healthcare center has been known as an important referral center owing to the advanced equipment used by a variety of medical specialists. According to the results of the current study, 26.4% of the referrals to the hospitals affiliated to Babol University of Medical Sciences accounted for patients coming from other towns with different medical conditions. This could be due to factors such as the provision of specialized care, presence of experienced physicians, higher quality of care compared to other towns, and availability of integrated medical services in these hospitals. Considering the noticeable rate of patient referrals from other regions to the hospitals affiliated to Babol University of Medical Sciences, it is recommended that the Ministry of Health and Medical Education pay special attention to enhancing the quality of care and medical equipment and allocating the required budget to these major healthcare centers. One of the limitations of the current research was the large number of study samples. Moreover, engagement of hospital record managers during working hours made the extraction and completing of the questionnaires difficult and time-consuming. Among the other limitations of this study were the illegibility of admission forms in some patient records, retrospective design of the study, and lack of access to some of patient data in medical records.

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