A Survey on the Performance of Hospitals of Qazvin Province by the Pabon Lasso Model

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Abstract

Significant advances in knowledge and technology, and also enhanced level of awareness in people have increased the need to ideal-quality services. In addition, since hospital expenses are high, monitoring hospitals' efficiency in offering services is of much importance. Therefore, the purpose of this study is to evaluate the performance of hospitals of Qazvin Province using Pabon Lasso Model. This descriptive, analytical and applied study was conducted in 2013 and all the eleven hospitals of Qazvin province selected by census sampling. Required data related to four consecutive years (2009-2012) were analysed by using SPSS-20 software after being collected. Fisher's test has been used to determine independency of variables. The results of the studies showed that average rate of bed occupancy, bed turnover rate and length of stay for the studied hospitals were 82.32, 69.04, and 4.2 respectively. Finally after drawing Pabon Lasso diagram, it was found that 0% of hospitals are in the first area, 9% in the second, 82% in the third, and 9% in the fourth area of Pabon Lasso diagram. Fisher's exact test indicated that significance level of independency test between the type of the hospital ownership and hospital efficiency is 0.77, and between the type of specialized services of the hospital and its efficiency is 0.76.Despite the obtained results (placing of 82% of hospitals in the third area (the ideal area)), it should be stated that during the studied years, no significant change has been observed in the performance of the studied hospitals regarding improving their efficiency (moving toward northeast of the diagram).For this reason, it is expected that in order to find the underlying reasons of this lack of improvement and also to plan for more advances in future years, some essential actions should be taken.

Keywords: Bed occupancy rate, bed turnover rate, average length of stay, performance evaluation, Pabon Lasso diagram.

Introduction

Despite all significant and undeniable advances in science and technology, some inadequacies and challenges can be observed in Health and Treatment Center[1]. Among all, we can refer to inefficiency and non-satisfied expectations of patients as constant threats to this system[2]. Public hospitals constitute the main part of health and treatment system of developing countries, and devote 50% of costs of health and treatment systems to themselves[3,4]. Aging of population and spread of non-communicable diseases, and also the increase in costs of diagnostic and treatment services have led to growing demand for services, particularly in public hospitals. As a result, evaluation of these centers and allocation of resources based on their efficiency have gained more importance than ever[7-5].

Evaluating performance provides useful information for managers in order to monitor and assess the status quo and the performance of hospitals[8]. Evaluation, which is used as a process for assessing efficiency of pre-determined plans, requires specific tools and patterns. Different models have been introduced for evaluating the performance of organizations which offer health and treatment services, each of which has its own features. One of the models that is applied nowadays based on the necessity of considering efficiency principle in optimal utilization of resources is evaluation of performance using hospital efficiency indicators[9,10].

Efficiency can be briefly defined as the maximum utilization of resources for improving efficiency. In order to determine the efficiency or inefficiency rate of each institution, appropriate indicators must be used as comparison criteria[11]. Hospitals'

efficiency in exploiting resources can also be measured using specific indicators, and by analysing them and planning for their improvement, we can expect enhancement of efficiency in this system[12,13]. However, when selecting performance indicators, we can use them for achieving important goals of policy-making, planning, and resource management only when more important indicators are first selected and then, by recognizing the relationship between the selected indicators, we can have constant supervision on hospitals' performance in a brief yet exact overview[14].

Studies show that there are different indicators for assessing hospitals' efficiency. The most important and practical of them are bed occupancy rate (BOR), bed turnover rate (BTR), and average length of stay (ALS) in hospital[10,15,16]. Bed occupancy rate is defined as the rate of occupied beds which is calculated as the ratio of occupied bed-days to active bed-days in a given period of time. If this ratio is multiplied by 100, bed occupancy percentage is obtained. Compared to other performance indicators of the hospital, the mentioned index has more applications as a general guideline in consuming resources of hospitalization[16].

The most ideal rate for bed occupancy in most hospitals is 85-90%, and the remaining 10-15% of beds is related to under-repairment beds, changing bedsheet, and preparing beds for next patients[14]. Bed turnover rate is the number of times patients use hospital beds during a given period of time. It shows the number of times a bed is occupied or vacant during a specific time period and indicates the average number of patients who use a specific bed during a given time interval. Average length of stay can be calculated by total of occupied bed-days in a given period to the number of discharged patients or defuncts in that period. Hospitalization period indicates medical decision for patient's stay in the hospital. Patient's social problems, unideal status of specialized services, lack of facilities, failure of diagnostic devices, and other factors can prolong patient's stay[16,17]. In most public hospitals which receive acutely-ill patients, average length of stay varies between 8-15 days[14].

Since evaluation of hospitals' performance using performance indicators is one of the working methods of problem detection, calculating and comparing them in different countries have been the subject of different studies. What they have in common is that simultaneous comparison of indicators has received less attention. This is while exploiting a method which can use these indicators in a combined and simultaneous manner will allow us to elicit several conclusions using one single comparison, and to assess the performance of hospitals in different conditions[15]. One of the techniques which can compare the above-mentioned indicators simultaneously is Pabon Lasso diagram introduced in 1986. Using Pabon Lasso diagram, we can evaluate and compare hospitals' performance. In evaluating performance by this method, we can identify the area the hospital lies in by determining indicators of bed occupancy rate and bed turnover rate and by putting them in the diagram. Moreover, by joining coordinate points of the hospital to coordinate center and extending it to the opposite sides, the point of average length of patient's stay will be determined[18]. Each of the areas in the diagram shows the average of performance indicators of hospitals and their efficiency level which are influenced by factors such as the number of active beds, the number of times patients come to visit, hospital specialty, and other factors[19].

Qazvin province has 11 hospitals in total including training and treatment centers, social security hospitals, private hospitals, charity hospitals, and army hospitals. Evaluation and comparison of hospitals' performance in a constant manner and using this type of analysis are applied to quickly recognize performance weaknesses and adopt strategies to modify defects in order to improve efficiency. In addition, using the obtained results we can find out about advances or lack of advance in hospitals' performance, and also transfer rare resources of health and treatment system to higher-priority centers in order to improve efficiency. Therefore, the present study evaluates the performance of Qazvin hospitals based on Pabon Lasso diagram from 2009 to 2012. It also provides information for administrators and policy-makers so as to decide about better allocation of resources among these centers, and identify and modify existing defects in their performance in order to improve their performance, efficiency, and quality.

Material and Methods

This descriptive, analytical and applied study was conducted in 2013 and all the eleven hospitals of Qazvin province selected. Due to the limitation of the number of hospitals and access to required data, all the eleven hospitals have been selected by census sampling. Among these, hospitals No. 1, 2, 3, 4, 5, and training and treatment collegiate centers, and hospitals No. 6 and 7 are related to social security organization. Hospital No. 11 is a private hospital and No. 10 is a charity hospital. Also hospitals No. 8 and 9 are public hospitals. Data collection tool is a checklist consisting of the number of active beds, active bed-days, occupied bed-days, and data related to Pabon Lasso diagram (bed occupancy rate, bed turnover rate, and average length of patient's stay). Data of this research were gathered in two stages: i. referring to Treatment Deputy and i. referring to hospitals in order to complete the required data. Extraction and analysis of data were conducted using SPSS-20 software, and comparison and analysis of the obtained results were conducted using Pabon Lasso diagram. In order to determine independency level of variables, Fisher's test has been used.

Results and Discussion

Obtained results are as follows:

Table-1
results obtained from 2009 to 2012

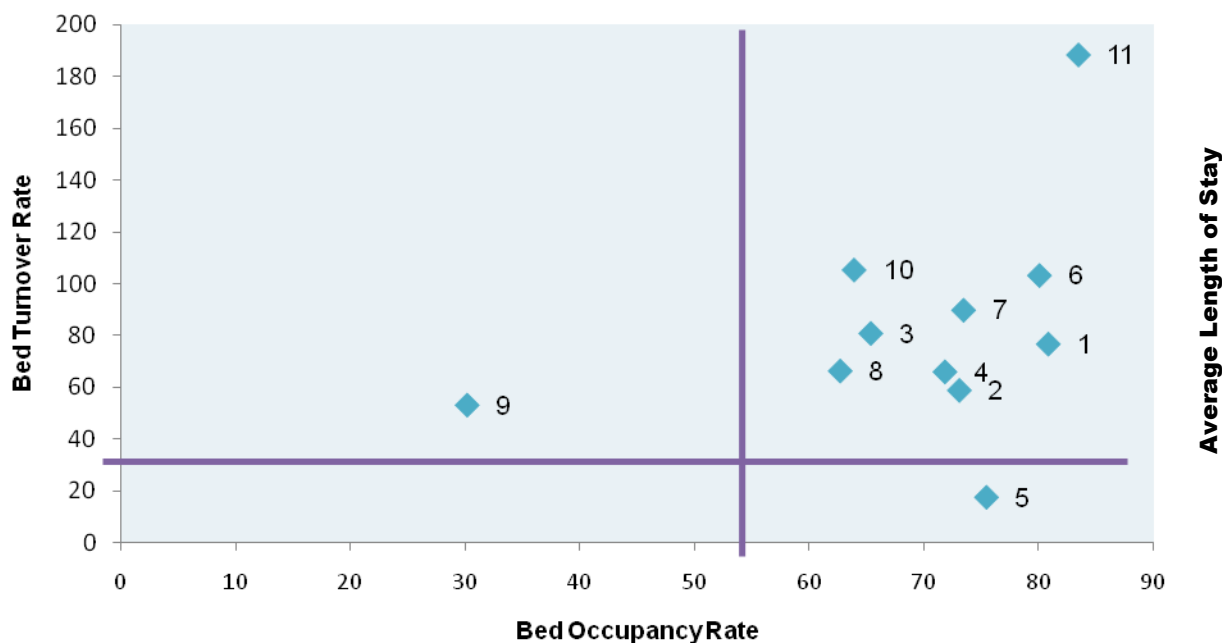| Hospital No.	Average of active beds	Average of active bed-days	Average of occupied bed-days	Average of bed occupancy rate	Average of bed turnover rate	Average length of stay
1	159	58270	47250	80.76	76.68	3.9
2	232	84534	61773	73	58.74	4.62
3	142	51951	30890	65.28	80.79	3.1
4	129	47085	33788	71.75	65.94	4.01
5	55	19983	15060	75.37	17.41	15.8
6	97	35360	28260	79.99	103.2	2.8
7	217	79144	58035	73.37	89.76	2.9
8	49	17945	9734	53.13	75.39	2.8
9	53	19345	5808	30.1	53.06	2.07
10	61	22160	14670	63.83	105.31	2.28
11	67	24962	21035	83.4	188.52	2

Figure-1
Pabon Lasso diagram for the studied hospitals from 2009 to 2012

According to the obtained results, the highest average of bed occupancy rate is 83.4 and the lowest one is 30.1. The highest and the lowest of the average of bed turnover rate were 188.52 and 17.41 respectively. Regarding the average length of stay during the studied years, the highest rate (15.8) is related to hospital No. 5, and the lowest rate (2) is related to hospital No. 11.

In sum, the general diagram for the studied years indicates that 82% of the studied hospitals lie in the third area, and 9% lie in the second and fourth area of the diagram. The diagram shows that none of the studied hospitals lie in the first area. Also, in the third area, hospital No. 11 lies in the most north-eastern part of the diagram.

Since hypotheses required for independency test of the two variables are not maintained, Fisher's exact test has been used. The results of this test are summarized in the following. Significance level of independency test between the type of the hospital ownership and efficiency rate is 0.77. Since significance level is greater than 0.05, it means that the null hypothesis i.e. independency between the type of the hospital ownership and efficiency rate is not rejected. As a result, it is said that these two variables are independent; in other words, the type of hospital use has also no effect on hospital efficiency.

Discussion: This study was conducted using data from-11 hospitals in the province during the period of the study. There has been little research of this kind in Iran, and previous studies

have been limited to evaluation of only one of the performance indicators. Using one index reduces the credibility of the study and generally causes the researcher to misinterpret the data. If the researcher does not use an appropriate analytical model which uses different indicators in data analysis, he will get generally misleading results. For instance, high levels of BOR (as an index of hospital performance) can be due to high levels of average length of stay which in addition to the hospital specialty, may result from long-term and un necessary hospitalization of patients and hospital in efficiency in using existing facilities[17].

In order to avoid this kind of errors, in the study, Pabon Lasso diagram was used which has three main performance indicators (percentage of bed occupancy and bed turnover rates and average length of stay). Concurrent review of the obtained indicators can guide to determine the centres' status. It is noteworthy that in studying and determining this status, ensuring about the validity of these indicators and the accuracy of their calculations for having any accurate assessment and judgment are necessary and drawing any quick conclusions should be avoided. Comparing the average BOR in the studies centers with the acceptable standards, it was shown that the centers' status in this index is relatively favorable, if, based on the available information, BOR is considered less than 55%, and the desirable goal to achieve is considered 75%[16].

Using a similar approach, if favorable minimum bed turnover is 35 times, bed turnover rate of 90% of the centers were more than 35times. In this case, according to the obtained results, only bed turnover rate in hospital No. 5 was less than 35 and the rate was17.41. Despite the result of Fisher's exact test and confirmation of the two variables' independency, it can be claimed that the bed turnover rate of hospital No. 5 is correlated with the specialty of the hospital. Hospital No. 5 is specialized psychiatric hospital, and due to the chronic nature of mental illnesses, the average stay in the hospital is heavy, and therefore bed turnover rate decreases. The status of other hospitals is desirable in this case. Also, comparing the average stay with the standard, which does not recommend more than3days of stay, indicates that only 54% of studied centers were at the standard level. The longest average of stay is for the hospital No. 5. According to the obtained diagram, during the period of the study, the hospital status was stable and 0% of the hospitals were in the first area, 9% in the second area, 82% in the third area and 9% were in the fourth area.

The percentage of centers which were in the first area of the diagram was 0% in this study. In other studies, the percentage of hospitals of the first area was 26%[15, 26]. 66%[17], 50%[19], and 16.66%[20].

The obtained results show that 9% of centers were in the second area. This area is related to centers in which, although bed occupancy rate is low, bed turnover rate is good and higher than the average level. Usually hospitals of obstetrics and gynecology and short-time hospitalizations belong to this group. In the conducted study in Orumiye County, this rate is 8.24% (15). In other studies, the percentage of centers lying in this area has been estimated as 13.33%[17], 0%[19] and 16.66%[20].

82% of the studied hospitals were in the third area of Pabon Lasso diagram. This rate has been estimated for Lorestan Province as 50%[20]. In other studies, rates of 26.66%[17], 34.28%[15] and 33.33%[19] were estimated for this area. The third area relates to centers which offer special types of services, have reputation, have good and strong personnel, use advanced medical equipment and technologies, and exploit modern and appropriate management methods; and thereby they could not only attract more customers, but also have the maximum utilization of resources by proper planning, and subsequently improve their efficiency. However, this does not mean that attempts for improving efficiency can be stopped here because efficiency improvement is an unbounded process. Therefore, continuity of moving towards efficiency improvement must have the highest priority for managers of these centers in order to increase the number of hospitals placed on the third area and also to change the position of hospitals toward the northeast part of the diagram. As can be seen in the diagram, hospital No. 11 is in the most north-eastern part of the diagram. Therefore, compared to other hospitals, this one has the most ideal condition. In this case, despite the general result of Fisher's exact test, it can be stated that the reason for this position is hospital's type of ownership. The mentioned hospital belongs to private sector and therefore, productivity is one of the main objectives. Since expenses of the first days of hospitalization are greater, in this hospital, length of stay is at minimum level (2 days), and considering the minimum level of stay, it has the highest bed turnover rate (188.52). These two factors along with high bed occupancy rate of this hospital improve its position on the diagram.

The last area is the fourth area and is related to hospitals which have high bed occupancy rate and low bed turnover rate. They are particularly used for mental health centers and geriatrics which have high average length of stay. Otherwise, they show inefficiency of centers in using resources and producing high costs for patients and the hospital itself. Keeping patients for a long time, particularly after the first days, incurs high damages to the hospital because patient's expenses merely include hoteling costs and its paying off will end in a difficult situation for the hospital. This is despite all financial and spiritual problems and losses that are incurred to the patient. In conducted studies in all years, only one hospital (9%) lies in this area. In the conducted researches, 31.48%[15], 33.33%[17], 16.66%[19], and 16.66%[20] of hospitals were in this area.

Conclusion

Considering the obtained results we can say that the appropriate strategy for centers lying in the first area of the Pabon Lasso diagram is that they should focus on weaknesses of hospitals

and thus improve them. Therefore, they must try to find out why bed occupancy rate and bed occupancy factor are low and has led them to be placed in the first area. On the other hand, hospitals of the fourth area can reduce their length of stay by adopting the strategy of using appropriate diagnostic and treatment services. They should finally be able to enhance their bed turnover rate and move toward improving the efficiency. As for the hospital lying in the second area with low bed occupancy rate, it seems that there are unnecessary hospitalizations and additional bed capacities. Therefore, necessary actions must be taken for justifying hospitalization and probably balancing the hospital capacity. Ultimately, for hospitals of the third area, the appropriate strategy is to maintain the status quo, use the efficient number of beds, and improve efficiency constantly.

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