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Assessing Hospital Performance in Iran Using the Pabon Lasso Model

R Kalhor, A Salehi, A Keshavarz, P Bastani and P Heidari Orojloo

Abstract

Background: Hospitals account for a large share of healthcare system expenditure. Therefore efficient use of resources is a significant goal in all healthcare systems, particularly hospitals. This study was conducted to assess the performance of hospitals affiliated with Qazvin University of Medical Sciences in Iran using the Pabon Lasso Graphical Model during 2008-2010.

Method: This cross-sectional study was implemented in six hospitals affiliated with Qazvin University of Medical Sciences. Related data were collected from Qazvin statistical documents during three different years from 2008 to 2010. The statistical software Excel was used to derive three basic performance indicators, namely Average Length of Stay (ALS), Bed Occupancy Rate (BOR) and Bed Turnover (BTO), which were analysed using the Pabon Lasso model.

Findings: The overall ALS, BOR and BTO rates were 4.1 days, 68.9% and 61.1 respectively. Just two out of the six hospitals were located in the third zone of the Pabon

Lasso diagram with high and acceptable efficiency. Two of the hospitals were in the fourth zone, characteristic of a high BOR but a low BTO rate and low productivity. One out of the six hospitals was located in the second zone of the graph indicating the low BOR and a high BTO rate. One of the other hospitals was situated in the second zone of the diagram in the year 2008, and had then fallen to the first zone during the next years with a low BTO rate and low BOR.

Conclusion: Just two out of six hospitals were located in the zone 3 indicating high and acceptable efficiency. This shows that the rest of the hospitals need more improvements in managerial decisions in order to enhance their efficiency and productivity.

Abbreviations: ALS – Average Length of Stay; BOR – Bed Occupancy Rate; BTO – Bed Turnover Rate.

Key words: Pabon Lasso; Average Length of Stay; Bed Occupancy; Bed Turnover; Iran.

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Introduction

There are a wide variety of healthcare systems around the world. Hospitals play an important part in these systems as they have the major and central role in providing healthcare services as well as being the first tier of referrals. [1] Furthermore hospitals are more complex in comparison with production organisations due to their major responsibility of providing both high quality and cost efficient healthcare services. [2]

Literature shows that in less industrialised countries, hospitals account for up to 50% of the total cost of healthcare systems. [3,4] Therefore the efficient use of resources is a common policy in all healthcare systems, particularly hospitals. [5,6] Nowadays, productivity and efficiency are

regarded as a culture and outlook in all healthcare systems and are considered as the sources of progress and economic development. [7] Productivity can be conceived as the quantity of goods and services produced per unit of input at a point in time. Productivity is also defined by the maximum production of products with the minimal use of human and material resources using advanced technology and generally better methods of management. [8]

Improved productivity in healthcare systems is the result of optimal, effective and efficient use of resources, minimising waste and reducing cost. In addition, high productivity in healthcare systems enhances quality, customer satisfaction and desirability in the workplace, which consequently leads to growth and development by the organisation. [9]

Since inefficiency and a lack of productivity constantly threaten healthcare systems, [10] performance assessment is an effective technique for managing activities. [10] There have been many studies about hospital performance assessment and also analyses of these assessments. [11] Furthermore, there are many performance indicators for measuring hospital efficiency. However it is only when one can use those indicators to achieve the important objectives of policy making, planning and resource management that, firstly, key indicators are chosen and secondly, using techniques such as graphical diagrams, one can easily understand the relationship between the indicators and in case of conflict, identify and remove the cause. [11]

One of the most important and useable models for assessing hospital performance or even assessing different sections within a hospital or healthcare system is the Pabon Lasso graphical model. This graphical model was devised by Pabon Lasso in 1986 to determine the relative performance of hospitals. In this method three indicators are used to evaluate the general performance of hospitals: the Bed Occupation Rate (BOR), Bed Turnover (BTO) and Average Length of Stay (ALS). [12] The BOR is the rate of useable beds in the hospital occupied by the patients. The BTO is the average number of admissions for each bed and the ALS is the number of days from admission to discharge for every inpatient. [13]

The Pabon Lasso Model is a diagram found by two crossing lines of the average BOR and the bed occupation turnover, divided into four zones. The y-axis denotes the BTO and the x-axis denotes the average BOR. [13]

Each hospital, by being placed in one of these zones, can assume special characteristics and by considering those characteristics, one can provide a practical analysis about

those hospitals. The management team can provide a relevant, reasonable evaluation of ways to improve performance. This allows decision-making and policy development to be based on scientific evidence. [13]

Pabon Lasso's diagram divides the hospitals into four zones:

1. Hospitals with low BTO and low BOR, which denotes the large number of hospital beds relative to the available demand;
2. Hospitals with a high BTO and a low BOR, which denotes undue and unnecessary hospitalisation; a large number of beds; and/or the use of hospital beds for patients with very simple problems. [12] These hospitals are generally obstetrics and gynecology hospitals. [14]
3. Hospitals with a high BTO and a high BOR. This zone denotes hospitals that have reached an appropriate level of efficiency with a relatively low number of unoccupied beds.
4. Hospitals with low BTO and high BOR. Usually these hospitals have patients with chronic diseases and longer stays in hospital or have an unnecessary long stay. These hospitals are generally hospitals for psychiatric patients and older people. [14-16]

The Pabon Lasso Model could be very important in terms of rapid detection of hospitals with low performance and finding appropriate strategies for correction of their performance. Therefore the purpose of the current study is to assess the performance of Qazvin University of Medical Sciences using the Pabon Lasso Model during the years 2008-2010 to examine the status of hospitals in order to achieve a higher performance. [15,16]

Method

This research is a cross-sectional study, which was conducted during three years from 2008 to 2010. The research population consists of six public hospitals affiliated with Qazvin University of Medical Sciences – Ghods, Shahid Rajaei, Booali Sina, Kowsar, Amir al Momenin and 22 Bahman, all located in Qazvin Province. Five out of six of these hospitals were teaching hospitals. In constructing the Pabon Lasso performance assessment diagram, three indicators of the ALS, BOR and BTO were required. The study data were collected from almanacs of Qazvin Province of the years 2008, 2009 and 2010.

For the analytical procedures, the means of the indicators of BOR and BTO of hospitals for each year were computed and the obtained numbers formed the y-axis and the x-axis of the diagram, respectively. Then, based on the data from each hospital, their places were specified on the diagram.

Table1: The performance of Qazvin University of Medical Sciences Hospitals in the years 2008-2010

	NAME OF HOSPITAL	TYPE OF HOSPITALS	MEAN OF AVAILABLE BED IN 3 YEARS	BED OCCUPANCY RATE (BOR)			AVERAGE LENGTH OF STAY (ALS)			BED TURNOVERS RATE(BTR)		
				2008	2009	2010	2008	2009	2010	2008	2009	2010
1	Ghods	Paediatrics – teaching hospital	128	67	69	72.3	3.8	3.8	3.7	60	62.9	73.8
2	Shahid Rajaei	Emergency centre, and surgical – teaching hospital	155	83	84.1	83.4	4.4	4	3.6	69.6	72.6	87
3	Booali Sina	General- teaching hospital	229	72	69.9	70.3	4.8	4.3	4.5	56.9	53.6	58.2
4	Kowsar	Obstetric and Gynaecology – teaching hospital	142	65	56.6	58.4	2.5	2.3	2.5	96	81.8	88.5
5	Amir-al-Momenin	General – non teaching hospital	56	36	32.2	22.5	2	2.1	1.8	66	54	46.8
6	22 Bahman	Mental hospital – teaching hospital	55	76	72.8	71.8	16	15.2	13.9	33.6	17.5	21.5
	Total			70	69.4	67.3	4.4	4.1	4	63.7	57	62.6

Findings

Table 1 shows the types of hospitals according to their specialisation and their mean of available beds during three years from 2008 to 2010. Hospital performance is also indicated in Table 1. As this table reveals, Shahid Rajaei hospital had the highest BOR and the highest BTO rate. Amir-al-Momenin and 22 Bahman hospitals had the lowest BOR and the lowest BTO rate respectively. Amir-al-Momenin and 22 Bahman hospitals also had the highest and the lowest ALS respectively.

Figure 1 shows the status of hospitals in the year 2008. The localisation of hospitals in the Pabon Lasso diagrams during this year shows that in the first year, hospital one lay on the border of zones 3 and 4. Hospital two with a BOR of 83 and a BTO rate of 69.6 was located in zone 3. Hospitals three and six were located in zone 4 of the diagram. Hospital four was located on the border of zones 2 and 3 and hospital five was located in zone 2.

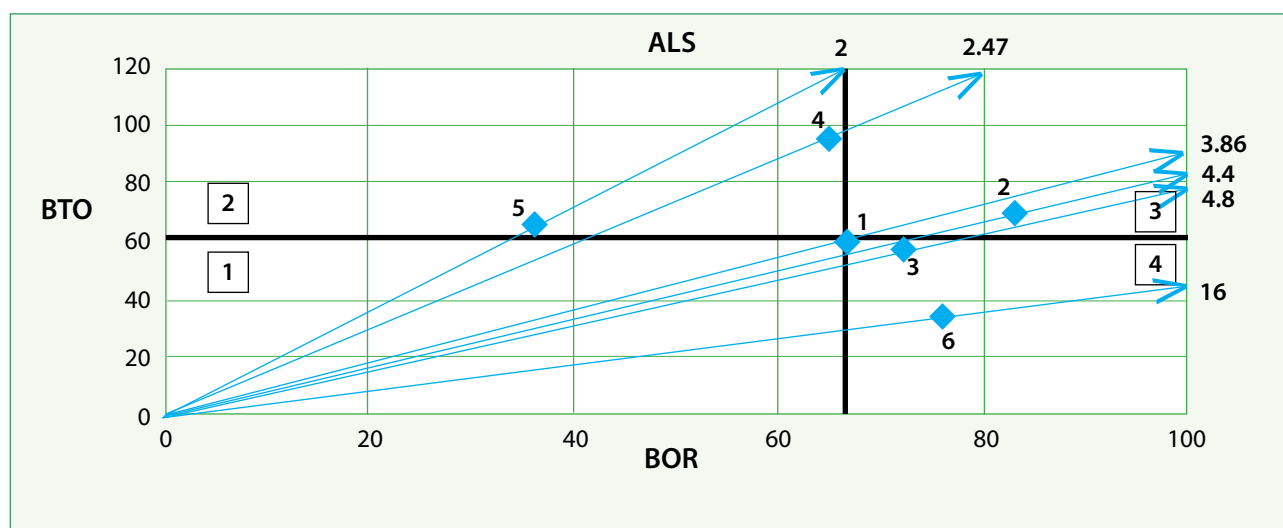
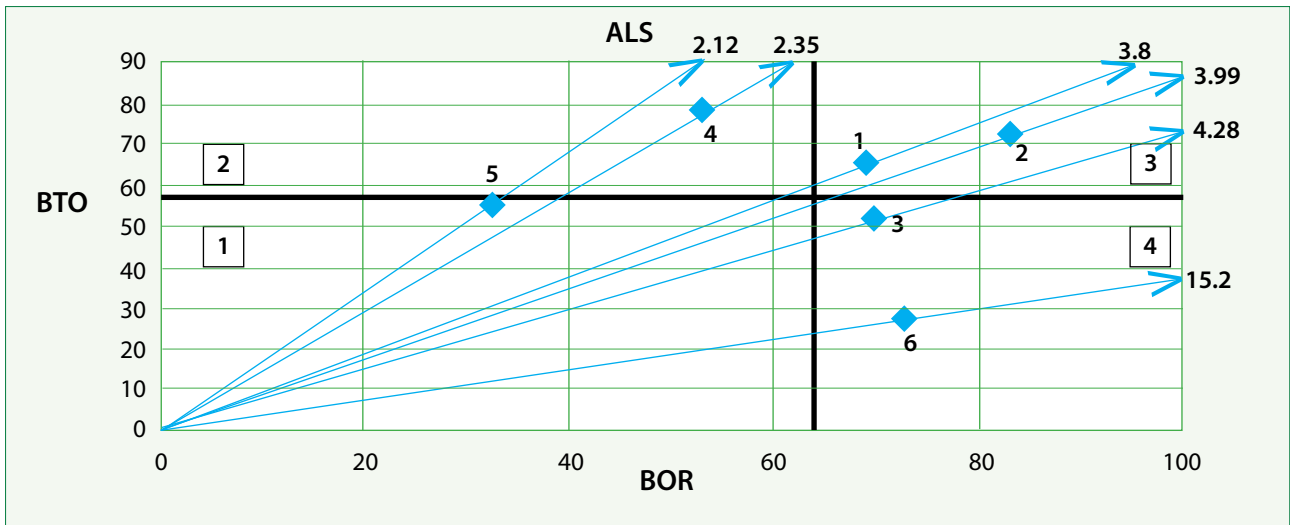
Figure 1: Pabon Lasso Diagram of Qazvin University of Medical Sciences hospitals in the year 2008

Figure 2: Pabon Lasso diagram of Qazvin University of Medical Sciences Hospitals in the year 2009



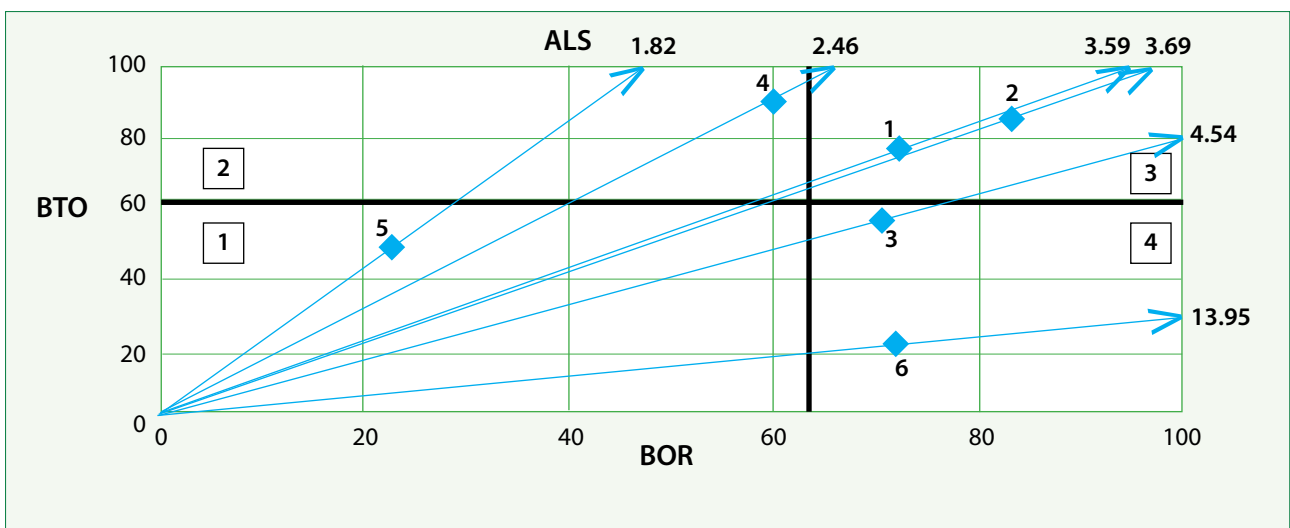
According to Figure 2, hospitals one and two, with a BOR of 69 and 84.1 and a BTO rate of 62.9 and 72.6 respectively, were located in zone 3 in 2009. However hospitals three and six were still in zone 4, the same as the previous year. Hospital four was located in zone 2 and hospital five with a BOR of 32.2 and a BTO rate of 54 was located in zone 1.

In 2010, hospitals one and two, with a BOR of 72.3 and 83.4 and a BTO rate of 73.8 and 87 respectively, were located in zone 3 of the diagram. Hospitals three and six were located in zone 4. Hospital four was located in zone 2 and hospital five with a BOR of 22.4 and a BTO rate of 46.8 was located in zone 1 of the diagram (Figure 3).

Discussion and conclusion

There are a variety of different indicators for measuring hospital performance. Although these indicators have a significant role in assessing the performance of hospitals and subsequently improving the management of resources, using individual performance indicators may lead to errors in making conclusions about a hospital's whole performance. For example, a high BOR could be due to both a higher average duration of stay, as a result of efficient use of resources for patients who need them, and also due to unnecessary hospitalisation and an inefficient use of resources. [12,14] Therefore the present study has used the

Figure 3 : Pabon Lasso Diagram of Qazvin University of Medical Sciences Hospitals in the year 2010



Pabon Lasso diagram. Since this model displays the three indicators of BTO rate, BOR and the ALS in a single diagram, it provides a rapid analysis on the general performance of the hospital and additionally reduces the risk of error that is more likely when indicators are analysed individually.

In the present study, Ghods hospital shows relatively good progress regarding performance. While in the year 2008, this hospital was located on the border of zones 3 and 4, in the years 2009 and 2010, with an appropriate growth, it progressed close to the northeast zone of the diagram (the best zone according to performance assessment), which could show strong hospital management in terms of maintaining a good productivity for the hospital. Therefore according to the result, Ghods and Shahid Rajaei hospitals are both located at the acceptable zone regarding efficiency (zone 3), probably due to appropriate management of services and observing hospital standards. In a study conducted by Bahadori in West Azerbaijan Province, eight hospitals out of the 23 (34.78%) were also located in zone 3. Sajjadi's study conducted in Esfahan Province revealed that 14 out of 31 centres (45%) in 2005, and 13 out of 31 centres (43%) in 2006, were located in zone 3. In the Goshtasbi study (2009), as with the present study, two hospitals out of six were located in zone 3. [12]

Efficiency improvement is considered to be a constant process. Therefore it is essential for healthcare systems to consider system efficiency as a first priority. Although Ghods and Shahid Rajaei hospitals had good progress in comparison with other hospitals in this study, maintaining this condition is important and even in some cases, may be more difficult.

Amir-al-Momenin hospital was located in zone 2 in 2008, while it fell down to zone 1 in the years 2009 and 2010. Being located in that zone shows a low performance and failure to use the available resources appropriately, indicated by both low BOR and low BTO rate. The general solution for such hospitals is not to increase the number of hospital beds, but to use the available resources appropriately. Additionally it is necessary that other intra organisational studies be conducted to detect problems and the weak points of these hospitals. In Bahadori's study, six out of 32 hospitals (26%), in Goshtasebi's study, two out of six hospitals and in Sajjadi's study in 2005, three centres (10%), and in 2006, two centres (6%), were located in zone 1.

Kowsar hospital is located in zone 2, which shows low BOR but high BTO rate, indicating short-term hospitalisation for patients. Potentially, there is the possibility of undue

hospitalisation and the presence of unoccupied beds in such hospitals. Hospitals of zone 2 are generally related to obstetrics and gynaecology specialisations. In Bahadori's study, two hospitals out of 23, in Sajjadi's study, 12 centres (39%) in the year 2005 and 14 centres (45%) in the year 2006 were located in this zone. However in Goshtasebi's study none of the hospitals were located in zone 2.

Booali Sina and 22 Bahman hospitals are located in zone 4, which indicate high BOR, low BTO rate, low utilisation of facilities and high costs. This could be characteristic of long-term inpatient centres such as psychiatric medicine and geriatric centres. In the present study 22-Bahman hospital is one of the centres providing mental healthcare, and this partly explains its being located in this zone. However, hospital Booali Sina, as a general hospital is also located in the same zone probably due to its failure to use the facilities available and the hospital's low performance. Therefore it is suggested that with appropriate planning, using modern managerial methods, providing new services and using advanced medical equipment and technologies, their low performance should improve.

This study shows that just two out of six hospitals were located in the zone 3 indicating high and acceptable efficiency. It is recommended that along with improving managerial decisions in those hospitals with low efficiency, other hospital performance assessing methods also be used to achieve a clearer picture of the situation.

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Competing interests

The authors declare that they have no competing interests and that this study has not been funded by any organisations.

Limitation

The sample may not have been representative of the other hospitals, and should be extrapolated to the other hospitals with caution.

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