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Original Research Article
**EVALUATING PERFORMANCE OF CHEST
DISEASES DEPARTMENTS USING HOSPITAL
EFFICIENCY INDICATORS IN TURKEY**

ABSTRACT

This study aims to investigate the performance of chest diseases departments using hospital performance indicators as specified in Pabón Lasso Modal (PLM). It is also intended to draw attention of hospital management on hospital performance issues to achieve a better level of functioning. This is a descriptive cross-sectional study analyzing chest diseases departments of state university and private university hospitals in Turkey. Convenient sampling method was chosen based on data availability of the hospitals and limitations of the PLM. Three major cities in Turkey (Ankara, Izmir, and Istanbul) were chosen based on population and obtainable data for the sampling purposes. Totally 10 hospitals were selected which 5 of them were state university hospitals and 5 of them private university hospitals. All of the results indicated that all chest diseases departments of private university hospitals were in a higher zone from the public university hospitals according to the PLM.

Key Words: Pabón Lasso Modal, Hospital, Performance, Turkey, Chest Disease Department

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24 1. INTRODUCTION

25 Healthcare industry, especially hospitals, consist an important part of the service sector. Because
26 hospitals play a crucial role in diagnosis of illness, they have a direct effect on human life and their
27 well-being (Bilal et. al. 1993). They are also the most costly component of health systems. Turkish
28 Department of Social Security stated that almost 5.6 percent of total Gross Domestic Product
29 (GDP) in Turkey is spending to healthcare (OECD, 2006). Different resources show around 6.2
30 percent of total GDP in recent years (Acar & Acar, 2014). These numbers show 600 USD \$ annual
31 healthcare spending for per one person in Turkey.

32 Liberal policies and actions trying to bring discipline in healthcare spending make hospital services
33 more competitive in Turkey. Hospitals need to monitor and evaluate their services and profits. At
34 each level of the hospital system, the utilization of the hospital capacity and the mix of patients and
35 offered services should be appropriate in order to provide quality services to all the patients at
36 minimum cost. Quality service and minimum cost require health management knowledge, with a
37 special focus on information use for performance improvement. In particular, data on outpatient
38 visits, in-hospital admissions and duration of hospital stay, as well as on service costs and staff
39 productivity, are routinely collected by the hospital information system and may be used to assess
40 the performance in service delivery. While service utilization measures can disguise important
41 dimensions of efficiency, they can also reveal whether the necessary inputs are reaching the
42 intended target groups and offer useful insights into the demand for services (Accorsi et. al., 2010).
43 It is clear that performance evaluation is an effective method used by hospital management for
44 evaluating and monitoring activities in the hospital. Pabón Lasso Modal (PLM) has been proved to
45 be one of the most useful tools for comparing the performance of different hospitals or different
46 divisions within the same hospital (Bontile, 2013; Kiadaliri, Jafari, & Gerdtham, 2012). PLM was
47 developed by Pabón Lasso in 1986. This modal is used for interpreting and comparing hospital
48 efficiency utilizing three hospital indicators: Bed occupancy rate (BOR), bed turnover rate (BTR)
49 and average length of stay (ALS). PLM's graph is divided into four zones by two perpendicular
50 lines; one is drawn from average BOR point on (X) axis and the other from average BTR on (Y)
51 axis. Regarding the quantity of these three indicators, each hospital assigns itself special features
52 by being positioned in one of the four zones of the chart.

53 Given a mathematical correlation among these three indicators, a line which starts from zero and
54 passes through each point in the graph shows ALS. ALS increases from left to right and top to
55 bottom consistently (Pabón Lasso, 1986). Either standard (least acceptable) value of the indicators
56 in a given region/country or the average of all hospitals' related index can be visualized as a basis
57 for graph subdivisions (Figure 1).

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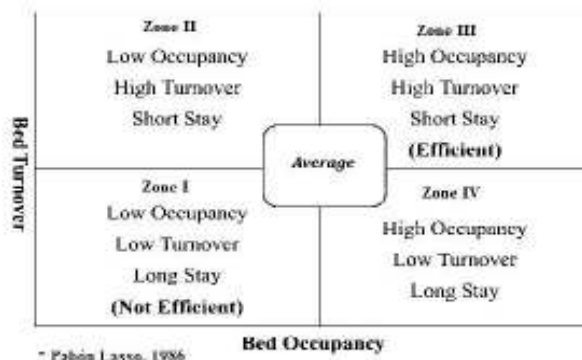
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Figure 1. Pabón Lasso diagram*



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62 The first zone presents non efficient hospitals with lower BTR and lower BOR. The second zone is
 63 characterized by lower BOR and higher BTR than the average. Maternity and gynecology hospitals
 64 and short-term inpatient centers usually rest in this zone. They have several unused and extra
 65 beds. Most of these beds might be used for patients with no need to hospitalization or for their
 66 possible examination. Hospitals in the third zone are both of high occupancy and turnover; pointing
 67 that these hospitals are efficient in resource utilization. In fact, a high BTR and BOR indicate that
 68 hospitals have reached an appropriate level of efficiency, with relatively few vacant beds at any
 69 time. Ultimately, a lower turnover and a higher occupancy than average rate are featured in Zone
 70 IV. The hospitals in this zone are expected to have long-term inpatients along with less utilization
 71 from their resources as well as high costs. More chronic diseases with unnecessary long-term
 72 hospitalizations and inefficient service delivery may cause this situation. Psychiatric hospitals and
 73 nursing homes are normally put in this area. The centre area indicates where average hospitals are
 74 located. This classification could assist to understand the hospital resource utilization and could
 75 help recognize facilities that are not used optimally. It is also important to remember that because
 76 such outliers as single-specialty hospitals such as psychiatric or gynecologic with overly long and
 77 short ALS and BOR might distort and skew the divisions (Pabón Lasso, 1986).

78 Three data elements; length of stays, number of beds, and number of discharges were taken into
 79 consideration for the study purposes. Formulas have been used for BOR, BTR and ALOS
 80 presented in Figure 2.

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Figure 2. Formulas

$$\text{BOR} = \frac{\text{Total length of stay in days per year}}{\text{Average number of beds per year} \times 365}$$

$$\text{BTR} = \frac{\text{Annual number of discharges per year}}{\text{Average number of beds per year}}$$

$$\text{ALOS} = \frac{\text{Total length of stay in days per year}}{\text{Number of discharges per year}}$$

This study aims to investigate the performance of chest diseases departments using hospital performance indicators as specified in PLM. It's also intended to draw hospital management's attention on hospital performance issues to achieve a better level of functioning.

2. Materials and Method

This is a descriptive cross-sectional study analyzing chest diseases departments of state university and private university hospitals in Turkey. Descriptive studies examine differences in occasions related to dependent variables. These studies are useful to identify patterns or trends in research area (Johnson and Christensen, 2014).

Convenient sampling method was chosen based on data availability of the hospitals and limitations of the PLM. Three major cities in Turkey were chosen based on population and obtainable data for the sampling purposes. Maternity hospitals, army hospitals, TB specified hospitals and no bed service hospitals were excluded from the hospital list in these cities. Two state university hospitals (H1 and H2) and two private university hospitals (H3 and H4) from Ankara (capital) city; one state university hospital (H5), two private university hospitals (H6 and H7) from Istanbul city, and two state university hospitals (H8 and H9) and one private university hospital (H10) from Izmir city which have solid and accessible data of chest diseases services were selected (Table 3).

Table 3. Hospitals

Hospital	Stay	Beds	Discharges
H1 State Uni. Hospital	9956	31	848
H2 State Uni. Hospital	27786	100	2154
H3 Private Uni. Hospital	1792	6	253
H4 Private Uni. Hospital	1421	5	413
H5 State Uni. Hospital	8721	36	629
H6 Private Uni. Hospital	5800	18	1656
H7 Private Uni. Hospital	1958	10	426
H8 State Uni. Hospital	15448	44	1122
H9 State Uni. Hospital	17109	97	2080
H10 Private Uni. Hospital	977	8	349

Table 3 presents total length of stay in chest diseases departments in days per year (stay), average number of beds (beds), and number of discharges per year (discharges). The quality of the data presented depends largely on the quality of the data reported by chest diseases departments in hospitals.

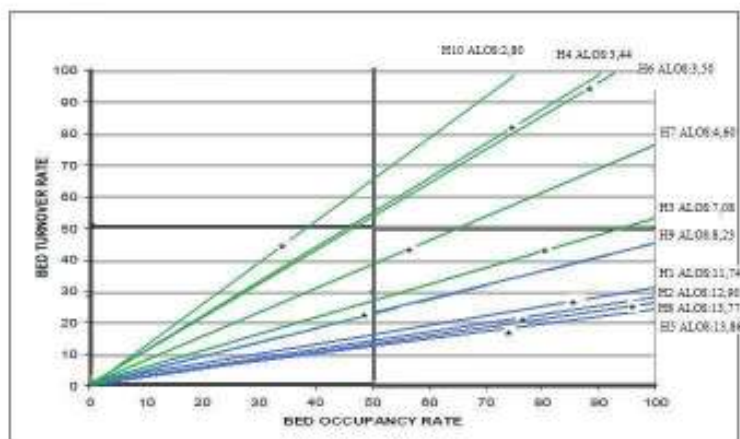
3. Results and Discussion

Chest diseases departments' of ten hospitals multiple indicators were convened using PLM for the study purposes. BOR, BTR and ALOS values were analyzed for the efficiency evaluation. Results have indicated that state university hospitals' chest diseases departments had the higher ALOS (Figure 3) comparing to private university hospitals. Among these hospitals, Istanbul had the higher ALOS (H5:13,86). The second highest ALOS and the lowest ALOS score among cities was found in Izmir (H8:13,77 and H9:8,23). Chest diseases departments of Ankara placed between highest and lowest scores with a relatively close to ALOS values of both Istanbul and Izmir cities (H1:11,74 and H2:12,90). Consequently, all university hospitals lied in Zone IV in the PLM modal. These results showed that chest diseases departments of state university hospitals had high occupancy, low turnover rate and long stay duration. Generally a shift towards outpatient services and efforts to overcome shortages and improved management is advised for the hospitals in zone four (Adham et. al., 2014).

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Figure 3. Chest diseases Departments' Distribution on PLM



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141 Results indicated that all chest diseases departments of private university hospitals were in zone
 142 three in PLM. Among these private university hospitals, Izmir had the lowest ALOS value
 143 (H10:2,80) while Ankara had the highest ALOS (H3:7,08). Private university hospitals in Istanbul
 144 lied between these scores (H6:3,50, H7:4,60). The second private university hospital from Ankara
 145 had a low ALOS value placing just above Izmir (H4:3,44). Zone three shows a good degree of
 146 efficiency and management. Hospitals located in this zone should follow up their strategy to ensure
 147 their services in optimal number of beds (Adham et. al., 2014).

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148 Research suggested that there is a correlation between number of beds and bed turnover. When
 149 number of beds increased, bed turnover rates get longer as well (Nawata et. al., 2009, Krantz et.
 150 al., 2008, Kroneman and Nagy, 2001). Current study also indicated that high bed capacity hospitals
 151 have high ALOS, low BTR and high BOR (H1, H2, H5, H8 and H9). All of the state hospitals' chest
 152 diseases departments were placed in zone four at PLM graph. Management of hospitals with high
 153 bed capacity should re-evaluate their practices to improve their effectiveness. It is stated that short
 154 bed occupation in hospitals will diminish the costs of health expenses and it must be a priority
 155 (Klein et. al., 2001, Clarke, 1996).

156 There have been differences also detected among state university hospitals and private university
 157 hospitals in terms of BOR, BTR and ALOS. Researchers suggested that the involvement level of a
 158 health expense affects the BOR, BTR and ALOS (Tekin, R.N., 2011, Mawasdeh et. al., 1997).
 159 Findings of current study also suggested that chest diseases departments of private university
 160 sector were placed in zone three while state university hospitals were placed in zone four in PLM. It

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161 can be suggested that customers' involvement in the expenses also affects their BOR, BTR and
162 ALOS. Raising involvement level in expenses decreases the figures of BOR, BTR and ALOS.

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164 4. **CONCLUSION**

165 This study presents that chest disease departments of state hospitals were in zone four in PLM.
166 They also had high ALOS values. When we look at chest disease departments of private hospitals,
167 they were mainly found in zone three indicating a better management. Monitoring performance of
168 hospitals constitutes a primary responsibility for healthcare sector management to increase their
169 efficiency. Despite the limitations of the hospital information system, data available from routine
170 sources are useful for performance monitoring and for identifying challenging areas in hospitals.
171 Commitment of management staff and experienced technical staff would increase the effectiveness
172 of given health services.

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Comment [h15]: The conclusion is an ordinary summary for the paper. It is weak as it fails to add value by emphatically touching on the practical implications of the study for hospital management. Any such statements in this section are too generic and therefore vague.

UNDER PEER REVIEW

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