Can public-private partnership (PPP) improve hospitals’ performance indicators?

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Abstract

Background: This study was conducted to compare the main performance indicators of Hasheminejad hospital before and after implementing PPP model.

Methods: This cross sectional study was conducted in Iran in 2015. Performance indicators of Hasheminejad hospital, the only Iranian unit that implemented PPP model, were applied. Data were collected based on a researcher-designed checklist after ensuring its validity and reliability. Data were analyzed applying SPSS21, and the Shapiro-Wilk test was used to examine the relevant data normalization. After confirming the normality of the data, descriptive statistics and paired t test were used to analyze the data at a significant level of 0.05.

Results: Dramatic variations were observed in the status of the studied indicators after the implementation of PPP in Hasheminejad hospital, and the changes were statistically significant in all these indicators (p<0.05).

Conclusion: It seems that implementing PPP in Hasheminejad hospital can be considered as a successful experience in Iran’s health sector. The significant improvement in this hospital’s performance indicators can emphasize the effective role of PPP in administration of this hospital. However, service quality and patient satisfaction should be considered as qualitative indicators, along with the present quantitative indicators because better judgment about the changes was achieved in this hospital after implementing PPP.

Keywords: Public-private partnership, Performance analysis, Performance indicators, Hospital, Iran

Introduction

Hospitals are considered as the most significant section of the health care systems worldwide, and, at the same time, they are the largest consumer of the rare resources allocated to the health sector (1). In developing countries, hospitals are accountable for almost 50% to 80% of the all health care system costs (2).

In Iran, as a sample of a developing middle-Eastern country, more than half of the health sector funds are allocated to hospitals (3). In this situation, low hospital bed occupancy rate, when compared with that of developed countries reflects the fact that the available resources are not distributed properly, which necessitates the use of right management methods (4). Therefore, policy-makers and senior officials are seeking ways to implement appro-

↑What is “already known” in this topic:
Public-private partnership (PPP) can be considered as a powerful political tool for improving and strengthening the survival of state-run hospitals and their quality of services. The implementation of PPP in many countries has shown its positive effects on health sector.

—What this article adds:
The collaborative model of Hasheminejad hospital and Moheb non-profit institution, which was implemented for the first time in the form of a PPP model in Iran, may have positive effects on hospital indicators. By localizing this model and adapting it to Iran’s circumstances, a good development in the field of health sector can be achieved.
Public-private partnership and performance indicators

To improve the conditions of hospitals in the country, especially in the public sector, it is necessary to take advantage of the capacity and potential of the private sector in the hospital system. However, this capacity and potential are not utilized in the public hospital sector. In this regard, the private sector can be an important partner in the development of the public hospital sector. The combination of the public and private sectors allows the strengths of each sector to be utilized while eliminating their weaknesses.

In Iran, for the first time, collaboration of governmental and non-governmental sectors in the health sector started with the cooperation of a non-profit patient support institution (Moheb) and Hasheminejad hospital to align the strengths of the public and private sectors and eliminate their weaknesses.

Hasheminejad is an educational specialist hospital in the field of urology and is affiliated to Iran University of Medical Sciences. Taking advantage of the capacity and potential of the private sector, a framework for modernization and equipment of the old state-run hospitals located in its vicinity. Profits from Moheb hospital activities are expended to equip and modernize Hasheminejad hospital and to expand and promote the services of Moheb hospital to other medical centers.

Considering Iranian experience in PPP and different benefits of implementing PPP in a hospital (eg, reducing governmental affairs and empowering the government to plan, set standards, finance, and make legislations; shifting the responsibility from the government to finance investments; using the element of competition to increase efficiency of the system, enhance self-management, and decentralize decision-making process, all of which emphasized in different studies), this study was conducted to compare the main performance indicators of Hasheminejad hospital before and after implementing PPP model.

Methods

This was a cross sectional study conducted in 2015 in Hasheminejad hospital. Performance indicators of the hospital were analyzed to determine if changes in the performance indicators of Hasheminejad hospital have been made as a result of the adoption of the PPP model and the placement of a non-governmental hospital (Moheb) in the vicinity of a state-run medical center (Hasheminejad). To this end, the status of this hospital was studied for performance indicators in 2 time periods before and after the adoption of this model (3 years before and 3 years after the implementation of the model) (2007-2012). Bed occupancy rate (BOR), average length of stay (ALS), and bed turnover ratio were selected as the most significant indicators to assess hospital performance.

Moreover, other indicators, including number of surgeries, days of hospitalization, admission rate, the net number of deaths, and number of patients referring to the outpatient unit or clinic and emergency ward were included to be studied monthly.

Bed occupancy rate is defined as occupied bed day in a hospital in a determined period of time divided by total bed day multiple by 100. According to Ministry of Health and Medical Education, the optimum range for BOR is more than 70%. Average length of stay is another indicator. This indicator is occupied bed day in a determined hospital divided by all the alive and dead patients in a special period with the standard rate of less than 3.5 days. Bed turnover ratio is defined as ready bed day in a hospital in a specified time subtracted by the total of dead and discharged patients in the same time with the standard ratio of less than 2 days.

A researcher-made checklist was designed to compare the stated indicators. The efficacy indicators were studied 36 months before and after the implementation of PPP in the hospital. The quality and effectiveness indicators were omitted from the checklist because of the sensitivity and confidentiality of the data and the hospital’s concerns. The checklist was designed in a way that all the indicators were separated according to month. The checklist’s face and content validity was confirmed by 4 health care and hospital management experts, and the checklist reliability

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was confirmed by Cronbach $\alpha>0.7$. Data obtained from this checklist were entered into SPSS statistical software [Version 16.0. Chicago, SPSS Inc] and STATA, and the Shapiro-Wilk test was used to examine the relevant data normalization. After confirming the normality of the data, descriptive statistics, paired t test, and Mann-Whitney were used for data analysis and trend analysis; significance level was set at 0.05. At the same time, interrupted time series analysis, known as quasi-experimental time series analysis, was applied as an approach for the analysis of a single time series of data (here, the performance indicators of the studied hospital) known or estimated to be affected by interventions (controlled external influences) (14).

**Results**

The process of changes in the performance indicators of Hasheminejad hospital before and after the implementation of PPP (launching Moheb Mehr) has been studied (Table 1). As shown in Table 1, there are dramatic variations in the status of the studied indicators after the implementation of PPP in Hasheminejad hospital, and the changes were statistically significant in all these indicators ($p<0.05$).

Other results achieved from interrupted time series with 1-month interruption are presented in Table 2. Most of the hospital performance indicators had significant differences before and after the intervention.

Other findings indicated that the main performance indicators (ALS, BTO, BOR) increased during the first 6 months of 2007 to the first 6 months of 2012. These indicators included bed occupancy rate, average length of stay, and bed turnover, respectively (Fig. 1). These findings are considerable because Hasheminejad hospital’s human resources have been consistent during the previous study years.

Figure 2 compares the trend fluctuations of all the 8 studied indicators in a snapshot. As Figure 1 demonstrates, 2 indicators, number of deaths and average length of stay, had a decreasing trend and most of other indicators had increasing trends, indicating improvement in the hospital’s performance after implementation of PPP.

**Discussion**

Based on Co-Location Model, Moheb Mehr hospital, a public-private hospital, was built in the vicinity of Hasheminejad hospital (a public hospital).

According to the results of this study, improvements in hospital performance indicators and quality of services are among the most important achievements and implications of implementing PPP in the provision of hospital services in Iran. Thus, after the implementation of PPP, positive effects will be observed on hospital performance indicators. The results of an investigation by Shadpour et al (15) showed that through the implementation of PPP model, a significant growth in the provision of hospital services in Hasheminejad hospital was observed. In fact, following a partnership with a non-governmental hospital (Moheb), there was no longer a need to refer patients to other centers, and waiting time for services also reduced, which increased the number of clients and reduced out-of-pocket expenses. Similar results have been obtained in other studies. The results of a study in Sao Paulo in Brazil revealed that PPP-based hospitals have a better performance and efficiency in terms of bed circulation, bed occupancy, length of stay, and mortality rate when compared with other hospitals in the area (16). The results of another study in Alzira in Spain suggested that costs were decreased by 25% in PPP-based Hospitals compared to those in public hospitals. In addition, patients’ length of stay and the waiting time to get services have been lowered in PPP-based hospitals (17). In Lesotho, the state-managed hospital network was compared with PPP-managed hospital network for capacity, utilization, clinical quality, and pa-

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**Table 1.** The status of performance indicators in Hasheminejad hospital before and after the implementation of PPP model

<table>
<thead>
<tr>
<th>Performance indicators</th>
<th>Mean and standard deviation</th>
<th>Variation rate</th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before PPP</td>
<td>After PPP</td>
<td>Before PPP</td>
<td>After PPP</td>
<td>Before PPP</td>
<td>After PPP</td>
<td>Before PPP</td>
</tr>
<tr>
<td>Bed occupancy rate</td>
<td>76.18±7.08</td>
<td>81.36±6.61</td>
<td>+5.18</td>
<td>649</td>
<td>1145</td>
<td>-2.72</td>
</tr>
<tr>
<td>Average length of stay</td>
<td>5.10±0.24</td>
<td>4.46±0.32</td>
<td>-0.64</td>
<td>61</td>
<td>214</td>
<td>-7.39</td>
</tr>
<tr>
<td>Bed efficiency or circulating</td>
<td>4.62±0.54</td>
<td>5.72±0.52</td>
<td>+1.10</td>
<td>110</td>
<td>606</td>
<td>-7.00</td>
</tr>
<tr>
<td>Days of hospitalization</td>
<td>2861±469</td>
<td>3167±412</td>
<td>+306</td>
<td>515</td>
<td>1011</td>
<td>-3.79</td>
</tr>
<tr>
<td>Number of admissions</td>
<td>710±72</td>
<td>714±72</td>
<td>+43</td>
<td>141.5</td>
<td>637</td>
<td>-6.75</td>
</tr>
<tr>
<td>Clinic referrals</td>
<td>4168±1048</td>
<td>5250±581</td>
<td>+1082</td>
<td>214</td>
<td>710</td>
<td>-6.18</td>
</tr>
<tr>
<td>Emergency referrals</td>
<td>1686±449</td>
<td>2239±441</td>
<td>+553</td>
<td>202</td>
<td>698</td>
<td>-6.27</td>
</tr>
<tr>
<td>Number of surgical operations</td>
<td>650±151</td>
<td>1061±130</td>
<td>+411</td>
<td>55</td>
<td>551</td>
<td>-7.44</td>
</tr>
<tr>
<td>Number of deaths</td>
<td>1.65±0.79</td>
<td>1.55±0.79</td>
<td>-0.10</td>
<td>478.5</td>
<td>2558.5</td>
<td>-4.08</td>
</tr>
</tbody>
</table>

**Table 2.** Results of trend analysis according to the intervention with 1-month interruption

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intercept</th>
<th>Pre-intervention slope</th>
<th>Change in slope</th>
<th>Change in the intercept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>SE</td>
<td>Value</td>
<td>SE</td>
<td>Value</td>
</tr>
<tr>
<td>Number of surgical operations</td>
<td>11.67</td>
<td>-2.013</td>
<td>125/8</td>
<td>-46/53</td>
</tr>
<tr>
<td>Bed occupancy rate</td>
<td>0.142</td>
<td>-0.146</td>
<td>2.968</td>
<td>-2.724</td>
</tr>
<tr>
<td>Average length of stay</td>
<td>0.00302</td>
<td>-0.00524</td>
<td>-0.529</td>
<td>-0.122</td>
</tr>
<tr>
<td>Bed efficiency or circulating</td>
<td>0.0176</td>
<td>-0.0105</td>
<td>0.649</td>
<td>-0.201</td>
</tr>
<tr>
<td>Number of admissions</td>
<td>3.785</td>
<td>-1.533</td>
<td>63.08</td>
<td>-29.8</td>
</tr>
<tr>
<td>Number of deaths</td>
<td>-0.0353</td>
<td>-0.0195</td>
<td>0.313</td>
<td>-0.298</td>
</tr>
<tr>
<td>Clinic referrals</td>
<td>90.89</td>
<td>-10.46</td>
<td>-637.8</td>
<td>-270.2</td>
</tr>
<tr>
<td>Emergency referrals</td>
<td>45.3</td>
<td>-3.046</td>
<td>-828.4</td>
<td>-124.3</td>
</tr>
</tbody>
</table>
Public-private partnership and performance indicators

Fig. 1. Trend analysis of bed occupancy rate, average length of stay, and bed turnover

Patient outcome, and the results showed the provision of high-quality services and obtaining remarkable achievements in the clinical outcomes of PPP-based hospitals (18).

In the present study, these significant changes in Hasheminejad hospital after implementing PPP are comparable with the whole performance ratios of Iranian governmental hospitals. Bastani et al. found a high degree of

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fluctuation in Iranian governmental hospitals’ bed occupancy rate from 31.4% as the minimum level in under 50 bed hospitals to 63.4% in more than 300 bed hospitals (1). Their results indicated a significant difference between the BOR of governmental hospitals and that of Hasheminejad hospital, with the average of 81%, after implementation of PPP.

Furthermore, although comparing the 4.46 days as ALS for this hospital after PPP indicates a moderate status according to Iranian Ministry of Health and Medical Education’s standards, it shows an improvement in this indicator when compared to its poor status before PPP, according to the above standards (19).

One of the limitations of this study was ignoring the quality of services along with quantitative ratios. In this regard, perceived quality of hospital care, as evidenced by the satisfaction and perception ratings of responders, the time spent waiting for treatment, and manner of support staff were better in a PPP-model hospital in India (20). Thus, it is recommended that future studies analyze the impacts of PPP in Hasheminejad hospital on the qualitative aspects, including accessibility of health facility, time

Fig. 2. Trends of the 8 studied indicators

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spent waiting, manner and quality of physician, nurses, supporting staff, and other personnel, perception of equipment, explanation of treatment details and general comfort.

Conclusion
It seems that implementing PPP in Hasheminejad hospital can be considered as a successful experience in Iran’s health sector. The significant improvement in this hospital’s performance indicators emphasizes the effective role of PPP in administration of this hospital. However, service quality and patient satisfaction should also be considered as qualitative indicators along with the present quantitative ones to have a better understanding of the changes that have occurred in this hospital after PPP.

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Conflict of Interests
The authors declare that they have no competing interests.

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