Original Article

Investigation and Prioritization of Factors Affecting Costs in Private Hospitals in Tehran

Ali Maher¹* ⓘD │ **Leila Mehrdana²** │ **Mehrnoosh Jafari³**

¹*Assistant Professor of Health Policy, School of Management and Medical Education, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

²*Student of the Department of Health Services Management, Faculty of Management, Islamic Azad University, Tehran Branch, North Tehran, Iran*

³*Assistant Professor, Department of Health Care Services Management, Faculty of Management, Islamic Azad University, Tehran Branch, North Tehran, Iran*

A B S T R A C T

The present study is descriptive in terms of applied purpose. The statistical population of this study comprised the staff (supervisors, head nurses, staffs of wards) of private hospitals in Tehran, including 140 people, by using Morgan table, 100 of these people were selected in the mentioned hospitals and by using cluster random sampling method, five hospitals were selected as a sample. In this study, a questionnaire with Likert spectrum and fuzzy analytical network process was used to perform pairwise comparisons. The average Cronbach's alpha coefficients were calculated above 0.8, suggesting acceptable reliability and validity. According to the analytic hierarchy process and prioritization of criteria, it can be seen that proper use of medical and non-medical consumables (S) has the highest rank with a final weight of 0.107065 and supervision of department warehouses and their organization (W)" with the final weight of "0.00559g" has the lowest rank of the factors related to reducing the cost of private hospitals in Tehran. The results of the study showed that the majority of units in the studied hospitals had operational losses despite their high capacity. In many of the units, there was a significant discrepancy between the number of services provided and the amount of services required to locate the operational center at the head point, imposing a financial burden on the studied hospitals.

Introduction

The health sector plays a key and constructive role in the economic and social structure of society. So, any kind of investment in this sector also affects the return of other economic and social sectors [1-5]. However, the health sector today is facing severe resource constraints in many countries [6-9]. In today's world, the level of progress of health services is considered as one of the indicators for measuring economic and social growth and development [10-12].

In fact, the importance of this research can be expressed as reviewing and prioritizing the

factors affecting cost reduction in private hospitals in Tehran. It is obvious that continuous efforts to improve the performance of hospitals, in addition to increasing productivity, will enable patients to benefit from services of better quality and quantity and also at a lower cost [20-22]. Health services affect the level of social welfare and consume a large part of national resources, so we should not neglect these services [23-26]. In developing and developed countries, hospitals are considered as vital and essential social resources that should be managed in order to benefit the society [27-29]. Due to the limited investment resources and its slow return in the health sector, as well as factors such as the high cost of hospital construction, expensive equipment and lack of skilled manpower in this sector, the expansion of hospital facilities is very slow and difficult [30-33]. The hospital ward is the most expensive among other wards [34-37]. Among all parts of the health system, hospital services are the most important factor in cost growth (10). And hospitalized patients have the largest share in the use of health services [38-40], while ward patients pay most of their treatment costs directly out of pocket [41-43]. Market-oriented mechanisms can help reduce the cost of hospital services [44]. Therefore, limiting care costs is one of the market-oriented mechanisms that has a greater impact on reducing costs, even in systems where hospitals are controlled by the private sector [45-49]. Countries that do not have significant market-oriented mechanisms for hospital services have taken steps to introduce stronger market mechanisms [50]. The effect of competition depends on the type of competition of the financing system, health care, hospital payment system, type of services in question, type of service providers, the possibility of new providers entering the rules and regulations governing the supply and demand for health care [50-52].

Care Organizations face challenges such as reducing the adverse consequences of medical services, improving service quality and performance of care systems, and reducing costs [53]. So, in order to overcome the challenges and increase the quality of services, these organizations are forced to use different approaches and management techniques such as continuous quality assurance, total quality management and etc. The service sector has received a lot of attention due to its increasing importance in the economy. Similarly, the importance of employees in the service delivery process has been effectively discussed [56-58]. Health system costs are rising; with a one percent increase in GDP per capita, health expenditures increase by 0.4 percent [2]. Countries around the world spent an average of about 6.3 percent of their GDP on health expenditures in 2015 [2]. In the Eastern Mediterranean, Africa, the United States and Europe, the rates were 9.7 and 9.6, 2.6, 3.5 percent respectively, and Iran's health expenditures was 5.4 percent. GDP increased in 2000 to 7.6% [6]. In 2015, about 22.6 percent of the general expenditures of the Iranian government was in health sector [54]. The average rate in the world was 9.9% [7]. Factors affecting the reduction of costs in private hospitals have been researched in many projects, and some of their findings are presented below:

In a study of focusing on hospitals, using the SDCA1 method, the following results were achieved: The final service sector accounted for 47.5%, the intermediary services sector for 24.3%, the overhead sector for 21.5%, and the annual depreciation expense accounted for 67% of hospital costs. Personnel costs were 48%, building and construction costs were 42%, equipment costs were 5%, utility costs were 3%, and materials and supplies were 2% of hospital cost. One hospital analyzed the actual costs of inpatient, emergency, and outpatient services and obtained significant results. The allocated budget was 50% higher than the actual cost of the service, which reflected the high cost wasted, the time wasted and the low efficiency. Personnel costs were about 84% of the hospital's total budget; only 12 percent of the staff physicians' contract time was used for treatment, supervision, management and teaching. Finally, it was concluded that in the desired organization, there is high inadequacy, chaotic organization, medical care and poor hospital management.

According to Ministry of Health, Treatment and Medical Education (2017) [55], on average, about 19% of the total revenue and 20% of the net (realized) income of the studied hospitals was in cash or the same amounts received from patients. The results of the study of the Health Economics Studies Unit of the Budget and Performance Monitoring Center of the Ministry of Health and Medical Education (2017) showed that the average share of cash revenue from the total revenue of hospitals was about 30% [56].

In today's world, the principle of competition behooves managers of organizations to focus on increasing customer satisfaction, reducing production costs and providing services with a high level of quality at work. Therefore, reviewing and recognizing customer satisfaction indicators and measuring customer satisfaction is important in that the level of customer satisfaction determines the success or failure of organizations. Satisfied customers are the source of corporate profits [8]. Companies that cannot keep customers satisfied will not remain in the market in the long run. Offering a high-quality product and providing excellent customer service continuously creates competitive advantages for the company, including creating competitive barriers, customer loyalty, producing and delivering distinctive products, reducing marketing costs and setting higher prices. Finally, there is an ethical point about quality; customers pay us to meet their expectations and we are responsible for them [1].

Results

In order to describe the data, the mean and standard deviation of the research data were used. A summary of descriptive statistics related to research variables is given in Table 1.

Table 1 Descriptive information on research components and their ranking based on the integrated ANP model

Ranking based on the integrated ANP model					Descriptive information related to research components								
The final standard weight	Fuzzy weight (based on language components)	standard weight	Research criteria	Rank	Skewness	Standard deviation	Average	Maximum	minimum	Number of data	Research criteria	Code	Component
0/107065	0/842566	12707/0	(S)	1	0. 048	0.723	5. 35	7	3	100	Looking to increase revenue instead of reducing costs	A	Factors affecting cost reduction in private hospitals
0/098353	0/842566	11673/0	(V)	2	0. 713	0.674	5. 59	7	5	100	Prepare a list of costs	B	
0/075874	0/825073	09196/0	(N)	3	-0. 176	0.888	5. 41	7	3	100	Develop the process of monitoring repairs in hospitals	C	
0/075277	0/822157	09156/0	(U)	4	0. 679	0.751	5. 65	7	5	100	Organize human resources and employ people in appropriate places	D	
0/075277	0/822157	09156/0	(R)	5	0. 541	0.855	5. 65	7	4	100	Review contracts	E	
0/052971	0/816327	06489/0	(H)	6	0. 492	0.758	5. 73	7	5	100	Involvement of hospital managers and	F	

											heads in supervising contracts	
0/051806	0/813411	06369/0	(P)	7	0.003	0.959	5.45	7	3	100	Activate of specialties and abilities in hospitals (optimal use of forces)	G
0/042881	0/804665	05329/0	(O)	8	0.543	0.764	5.71	7	5	100	Payment based on the performance of staff in the ward	H
0/037161	0/819242	04536/0	(Q)	9	0.038	0.934	5.41	7	3	100	Hospital discount based on outpatient services according to the notification of the Ministry	I
0/036727	0/819242	04483/0	(F)	10	-0.052	0.883	5.37	7	3	100	Preventive maintenance of equipment, building	J
0/024736	0/80758	03063/0	(E)	11	0.063	0.906	5.37	7	3	100	Saving hospital energy consumption, office and non-office consumables, etc.	K
0/024252	0/80758	03003/0	(D)	12	0.701	0.727	5.63	7	5	100	Analysis of hospital energy consumption	L
0/024647	0/804665	03063/0	(L)	13	-0.186	0.859	5.37	7	3	100	Revision of the receipts of specialists after the implementation of the transformation plan.	M
0/016272	0/798834	02037/0	(B)	14	0.433	0.798	5.78	7	5	100	Attracting physicians full of cases	N
0/012268	0/778426	01576/0	(G)	15	-0.136	1.035	5.63	7	3	100	Activating the hospital economics committee	O
0/011488	0/772595	01487/0	(I)	16	0.596	0.769	5.69	7	5	100	Elimination of high-consumption electrical appliances	P

|												
0/011218	0/772595	01452/0	(C)	17	0.404	0.930	5.73	7	4	100	Increasing the executive power of hospital managers	Q
0/007729	0/766764	01008/0	(J)	18	0.414	0.738	5.76	7	4	100	Proper use of medical equipment	R
0/007729	0/766764	01008/0	(M)	19	0.195	0.823	5.90	7	5	100	Appropriate use of medical and non-medical consumables	S
0/007675	0/766764	01001/0	(K)	20	0.048	0.723	5.35	7	3	100	Estimation of appropriate workload with manpower	T
0/005683	0/763848	00744/0	(A)	21	0.464	0.778	5.76	7	5	100	Monitoring the cost of repairing medical equipment	U
0/005599	0/763848	00733/0	(T)	22	0.195	0.823	5.90	7	5	100	Monitoring near-expiration drugs	V
0/005599	0/763848	00733/0	(W)	23	0.048	0.723	5.35	7	3	100	Supervising the warehouse of the departments and organizing them	W

As can be seen, based on the opinions and professional experience of the staff (supervisors, head nurses, staff of the wards), private hospitals in Tehran showed an average of appropriate responses. Cronbach's alpha test indicated the reliability of research data. According to experts, the first level of network analysis is the main criteria. The expert pairwise comparison tool first determines the priority of each of the main criteria by pairing the main criteria based on the goal [89-91]. So, we must to compare the criteria based on the goal in pairs. If the significance of the element i over j is equal to n, the significance of j over i is equal to 1/n. According to this point, it is enough to fill in the following matrix with only the values above the original diameter. Values below the original diameter will be the inverse of the values above the diameter. It should be noted that in the case of criteria, we must pay attention to their type. It is important to pay attention to the type of criterion in the method of calculating its weight [92-95]. Figure 1 shows determining the weight of cost reduction factors for private hospitals in the Super Decisions environment, based on expert opinions. The final weight is the effective criteria for extinguishing ship fires in ports and providing solutions to reduce risk and increase safety. Using fuzzy logic calculations, after fuzzy ranking of research criteria, it was found that according to analytic hierarchy process and prioritization of criteria, it can be seen that "proper use of medical and non-medical consumables (S)" has the highest rank, with a final weight of 0.107065 and "Monitoring of near-expiration drugs (V)" with a weight of 0.098353, has the highest rating and "Look to increase revenue instead of reducing costs (A)" with a final weight of 0.0056830 while "Estimation of workload in proportion to manpower (T)" with a final weight of 0.005599 and "Supervision of warehouses and their organization (W)" with a final weight of 0.005599, have the lowest rank of factors related to reducing the cost of private hospitals in Tehran.

The results of reliability statistics using Cronbach's alpha test indicated high reliability of the data collection instrument in this study;

because the average Cronbach's alpha coefficients were calculated above 0.8, which showed that the opinions and professional experience of experts and specialists were reliable [96-98].
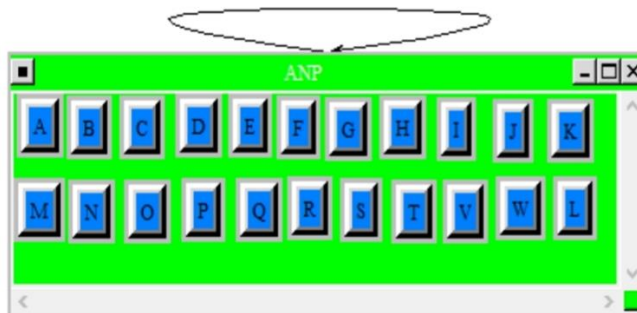
Figure 1 Modeling, an integrated ANP model for factors affecting cost reduction in private hospitals

According to experts, the first level of network analysis is the main criteria. The expert pairwise comparison instrument first determines the priority of each of the main criteria by pairing the main criteria based on the purpose. Therefore, we must compare the criteria based on the goal in pairs. If the significance of the element i on j is equal to n, the significance of j on i is equal to 1/n, and according to this point, it is enough to fill in the following matrix with only the values above the original diameter.

Values below the original diameter will be the inverse of the values above the diameter. It should be noted that in the case of criteria, we must pay attention to their type. It is important to pay attention to the type of criterion in the method of calculating its weight. Figure 2 shows the weighting of cost reduction factors for private hospitals in the Super Decisions environment, based on expert opinions [99-101].
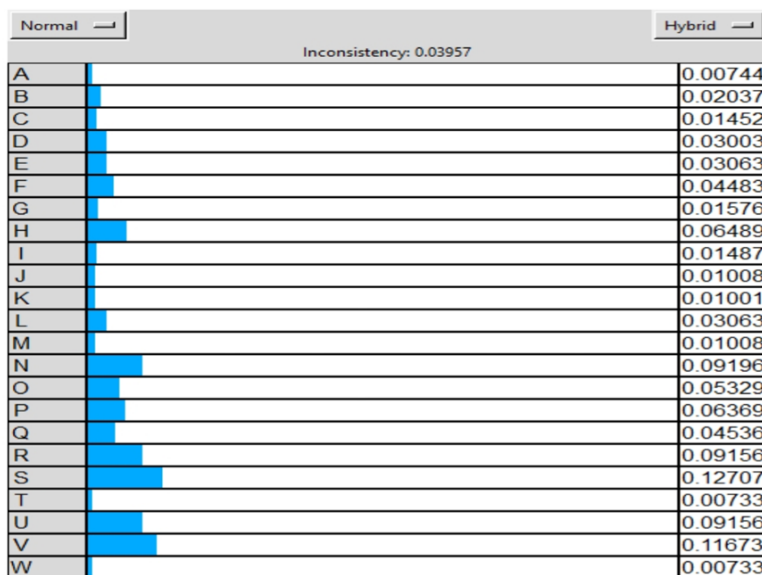
Figure 2 Ranking of factors based on the integrated ANP model

Discussion

This study was conducted to investigate and prioritize the factors affecting cost reduction in private hospitals in Tehran. The results showed that "Proper use of medical and non-medical consumables (S)" has the highest rank with a final weight of 0.107065 and "Monitoring of near-expiration drugs (V)" with a weight of 0.098353, had the highest rating while "Look to increase income instead of reducing costs (A)" with a final weight of 0.005683, "Estimating the volume of labor in proportion to manpower (T)" with a final weight of 0.005599 and "Supervision

of warehouses and their organization (W)" with a final weight of 0.005599 had the lowest determined rank of the factors related to reducing the cost of private hospitals. Based on the research findings, the following items can be a useful step in improving the productivity of medical centers: Proper management and principled review of the structure of financial resources according to their importance in the hospital economy, proper provision of resources based on principled needs assessment, workflow of resources, replacement of factors and institutions according to the degree of resilience, effort in order to discover the causes of unfavorable deviation of costs and efficiency of services provided compared with previous periods and identifying areas that need immediate intervention, using new management methods in controlling and reducing the costs of resources and inputs, conducting extensive studies to review tariffs and annual variables in it, reforming payment systems, performance-based budget allocation and adherence to the principle of flexibility in budget allocation. Today, health centers, especially hospitals, have the bulk of resources allocated to the health chapter, so controlling resources for efficient use and preventing their waste is one of the important tasks of management. Inclusive quality management is not just about the product, hospital managers and policymakers need to be aware that in the short term, to make decisions about controlling and reducing costs and increasing hospital productivity and efficiency, we need to focus on key areas by paying special attention to the cost and make principled decisions by analyzing these points. (20) The nosocomial study using the SDCA1 method achieved the following results: The final service department accounted for 47.5%, the intermediary services department for 24.3%, the overhead department with 21.5%, and the annual depreciation expense accounted for 6.7% of hospital costs. Personnel costs were 48 percent, building costs were 42 percent, equipment costs were 5 percent, utility costs were 3 percent, and materials and supplies were 2 percent of hospital costs. In Study (2), the allocated budget was 50% higher than the actual cost of services, which reflected the high wasted cost, high wasted time, and low efficiency.

Personnel expenses accounted for about 84 percent of the hospital's total budget, and only 12 percent of the staff physicians' contract time was used for treatment, supervision, management, and teaching. The Ministry of Health, Treatment and Medical Education, (2017) had an average of about 19 total revenues and 20 net (realized) revenues of the studied hospitals, cash income or the same amounts received from patients. The results of the study of the Health Economics Studies Unit of the Budget and Performance Monitoring Center of the Ministry of Health and Medical Education in 1396 showed that the average share of cash income from the total income of hospitals was about 30% [102-104].

Conclusion

According to the results of the study, the majority of units in the target hospitals had operational losses despite high capacity. In many of the studied units, there was a significant discrepancy between the number of services provided and the amount of services required to locate the operational center at the head point, imposing a financial burden on the studied center. According to the results of the present study, other cost reduction strategies such as optimal use of all available capacities, training and development of growth and productivity culture, organizational structure reform (re-engineering in the organization), attention to information system (speed and accuracy of organization), reducing the share of human resources in the staff queuing, activating the suggestion system, promoting teamwork, forming a quality circle (QCC), creating an effective evaluation system, creating an appropriate motivational system in the organization, developing creativity, innovation and entrepreneurship in the organization are recommended.

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ORCID

Ali Maher

https://www.orcid.org/0000-0002-0448-284X

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