Performance Evaluation of Top and Middle Managers in Teaching Hospitals

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ABSTRACT *Hospitals are of the most complex organizations which require a strong and impactful management. Thus, providing a comprehensive set of functional scopes and criteria for hospital managers is very important. This study was mix method research that analyzed the performance status of hospitals managers in Yazd Province dealing with a set of qualitative and quantitative research methods and providing a performance evaluation model. This research was approved by the Ethical Committee of TUMS. The subjects signed the informed consent form to participle in the study. Confidentiality was maintained throughoutthe study reports. First, using Fuzzy AHP, the chosen dimension was weighed. Finally, the weighing was conducted based on the selected functional aspects, a questionnaire was designed and after confirming the reliability and validity, through a census, 407 senior and middle managers from 10 hospitals in Yazd Province, completed them and was evaluated the performance of the directors of these hospital .To measure the performance of managers, was developed a functional model consisting of nineteen sub-domains in five main domains (functional, professional, organizational, individual and human). The functional area was of the greatest importance and weigh (0.3735) and the individual area was the least importance and weight (0.0662).The use of areas and appropriate performance criteria, prioritizing them and evaluating the performance of hospitals' managers by using appropriate techniques, can play an effective role in the selection of qualified managers.*

Introduction

The success of any organization to achieve its predetermined objectives is highly dependent on the performance of the organization's managers. In fact, the managers by selection of their significant strategies and decisions, play an important role in the allocation of resources, improve the quality of services provided and ultimately improve organizational performance (1).In particular, this issue becomes more important at the case of health care organizations dealing with human life (2). In fact, the role of hospital managers is different from the role of managers of other organizations and industries. Although they both require similar skills and knowledge in management and organization development (3). On the other hand, given that the largest share of the cost of the health budget is allocated to health organizations, especially hospitals and these organization are important levers for providing health services, and managers of these organizations are responsible for the operating the goals and visions determined by policy-makers in order to enhance the welfare and well-being of the community, therefore, the correct evaluation of managers plays a crucial role for the correct use of the costs and health promotion (4, 5) and has a significant impact on all members and stakeholders of the organization (6).While the existence of an effective and efficient evaluation system is crucial for identifying skills and potential talents of people (4) but unfortunately, no formal and systematic system has been applied for evaluation of hospital managers and using the subjective, instant and informal assessments of managers, led them to do actions which are compatible with the subjective model of the as-

sessor (7). If the performance evaluation system of hospital managers be efficient and tangible and measurable indicators be existed to evaluate them, many of the costs can be reduced in hospitals and better services can be provided to the population received services. That's why provision of good services depends on good and effective management (8, 9).However, the assessment is a specific process which one of the most important steps is definition or evaluation specified, accurate and feasible criteria (2). Therefore, in order to improve the performance of hospital managers, it is needed to evaluate them based on specific, detailed and feasible criteria in a suitable model to finally be able to select and train managers with appropriate and required competencies, contribute to increase the efficiency, effectiveness and accountability in the health service support (10). So far several studies have been done to assess the competence and performance and provide criteria and scopes of competence and a function appropriate to the activities of managers in the health field in different countries (10-15).

Also in international studies which recently have been conducted to evaluate the performance of health care managers, most of times, competency -based models have been used to assess the suitability and performance of managers (9, 16-20). Designating appropriate and prioritized areas, indicators and criteria to functionally evaluate the performance of hospital managers in an appropriate model and taking into account local conditions, is an important affair that this study seeks to answer it. In addition, in this study to evaluate the hospital managers, the Fuzzy

AHP technique has been applied for weights to the criteria and been used to evaluate managers that this technique has been employed in many articles carried out to evaluate the performance and has been emphasized on the effectiveness of them (21-27). Considering all the above, this research in addition to present a model for evaluating the performance of hospital managers, analyzed the performance of ten hospitals administrators in Yazd Province using the techniques of Fuzzy AHP ..

Materials & Methods

This study was mix method research that analyzed the performance status of hospitals managers in Yazd Province dealing with a set of qualitative and quantitative research methods and providing a performance evaluation model. This research was approved by the Ethical Committee of TUMS. The subjects signed the informed consent form to participle in the study. Confidentiality was maintained throughout the study reports. First, reviewing various research, studies and scientific literature in the fields of competence and performance evaluation and with a focus on hospital administrators, was obtained a list of dimensions and performance indicators, respectively. In order to achieve a conceptual framework for performance evaluation, a questionnaire was designed containing measures and performance indicators derived from the literature review, and was sent to 20 experts of the health management and performance evaluation area (including managers of hospitals and health care networks, university professors and experts involved in the evaluation of performance at the university level, and the Ministry of Health).

After collecting the opinions of the experts in connection with the proposed scopes and criteria, holding a 7-member panel of experts (including 3 administrators of the hospital, 2 university academic subjects and 2 of the experts in evaluation unit of academic performance), the final criteria and indicators were classified and the necessary consensus was obtained on the conceptual framework of functional areas and functional criteria for hospital managers and so that was confirmed the final model and its validity, as well. Then the paired comparison questionnaires were designed in order to prioritizing and weighing areas and subareas of performance of the final model, and in order to be completed, were presented to 21 of stakeholders in the process who somehow are affected or related to the performance of the managers. In order to using the technique of Fuzzy Analytic Hierarchy Process (FAHP) be determined the relative weight of each criterion and sub-criterion to each other (for more information about the process and the measurement of indicators' weight using the Fuzzy AHP method, refer to the articles (21, 280. In the next step, an 83-item questionnaire was developed from the conceptual model, was designed to evaluate the performance of hospital administrators and after confirming the reliability (Cronbach's alpha 0.96) and validity, the performance of managers of 10 hospitals associated with the Shaheed Sadoghi Yazd University of Medical Sciences (21 , 28 0.

2.3 Fuzzy Analytic Hierarchy Process

Analytical hierarchy process (AHP) is a powerful decision-making methodology for calculating the weights and priority of different criteria. This technique first proposed by Saaty (1980). AHP technique is often criticized, because of its inability to manage the inherent uncertainty and imprecision in the pairwise comparison process (Deng, 1999). FAHP was proposed by Van Laarhoven and Pedrycz (1983) to overcome these shortcomings because it's more accu-

rate to give interval judgments than fix value judgments (Avazpour et al., 2013).The procedure of FAHP summarized as follows:

Step 1: construct the hierarchy of decision problem

Step 2: Definition of fuzzy numbers for doing paired comparisons.

Step 3: Construct the Paired comparison matrix using fuzzy numbers.

$$\tilde{D} = \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \dots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \dots & \tilde{x}_{2n} \\ \vdots & \vdots & & \vdots \\ \tilde{x}_{n1} & \tilde{x}_{n2} & \dots & \tilde{x}_{nn} \end{bmatrix} \tag{5}$$

Step 4: Calculate S_i for each row of the paired comparison matrix

$$S_i = \sum_{j=1}^{m} M_{gi}^i \times \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^i \right]^{-1} \tag{6}$$

In above equation, i is the number of row and j is the number of column.

$$\sum_{j=1}^{m} M_{gi}^i = \left(\sum_{j=1}^{m} l_j, \sum_{j=1}^{m} m_j, \sum_{j=1}^{m} u_j \right) \tag{7}$$

$$\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^i = \left(\sum_{i=1}^{m} l_i, \sum_{i=1}^{m} m_i, \sum_{i=1}^{m} u_i \right) \tag{8}$$

$$\left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^i \right]^{-1} = \left(\frac{1}{\sum_{i=1}^{m} l_i}, \frac{1}{\sum_{i=1}^{m} m_i}, \frac{1}{\sum_{i=1}^{m} u_i} \right) \tag{9}$$

In the relations, l_i, m_i and u_i are respectively the first to third components of fuzzy numbers.

Step 5: Calculate the large degree of S_i relative to each other

If $M_1 = (l_1, m_1, u_1)$ and $M_2 = (l_2, m_2, u_2)$ are two triangular fuzzy numbers:

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \mu_{M_2}(d) = \begin{cases} m_2 \geq m_1 \\ l_1 \geq u_2 \\ \frac{1}{(m_2 - u_2) - (m_1 - l_1)} \end{cases} \tag{10}$$

Step 6: Calculate the weight of criteria and options in the paired comparison matrix (11)

$$d'(A_i) = Min V(S_i \geq S_k) K = 1, 2, \dots, n, k \neq i$$

Step 7: Calculate the final weight (12)

Results

The conceptual framework for evaluating the performance of hospital administrators To extract dimensions and performance indicators for hospital managers, first, a comprehensive review was done through search in various databases. Then polling experts and holding a panel of experts, the final functional aspects were determined. The results containing the final functional areas and subareas are seeable in Table 1.

Table 1: Main dimensions and functional sub-domains related to hospital managers

The functional aspects achieved from the literature review, surveys and holding the panel of experts, were placed in the 5 main domains and 19 sub-areas and was acquired the hospital administrators' functional and conceptual framework. Five main areas including functional (including four sub-dimensions of planning, organizing, leading and controlling), professional (including 4 sub-dimensions of individual professional behavior, professional organizational behavior, personal continuous improvement and education, and continuous organizational development and improvement) humanistic (including three sub-dimensions of patient-orientation, relationship management and human safety); organizational (including 4 sub-dimensions of in-

formation management, human resource management, financial resources management and management of physical resources) and individual(includes 4 sub-dimensions of characteristics, innovation and creativity, analysis, perception and decision-making), respectively.

Determining the major and minor functional areas of hospital administrators Then, the paired comparison questionnaire of the functional areas and subareas was provided to 21 experts and using the Fuzzy Analytic Hierarchy Process, was obtained the weight of functional areas and subareas. Table 2 shows the weight and rank of each of the functional areas and subareas.

As Table 2 shows, the dimensions of functional (0.3735) and individual (0.662) have gained the most and least weight and significance factor, respectively. In addition, in the main functional scope, the subarea of leadership had the highest weight of 0.3426 and organizational subarea had the lowest weight of 0.1610, respectively. In the main scope of professionalism, the continuous organizational improvement was the first priority (0.3426) and the individual professional behavior (0.1610) was the last priority and in human area, the relationship management (0.3477) and the patient-orientation (0.3189) have gained the most and least significance, as well. In organizational area, the human resource management (0.4293) and management of physical resources (0.0984) have gained the most and least significance factor, respectively. In the individual area, the decision-making (0.3859) had the highest weight and the innovation and creativity (0.1607) obtained the lowest weight, as well.

After gaining the weight of functional areas and subareas, the questionnaire designed to assess and analyze the functional status of the hospital administrators of Yazd Province was distributed between the respondents and their performance was evaluated according to each of the major and minor areas that the results are shown in Table 3.

Assessment and functional ranking of hospital administrators separated for each of the functional subareas within the main areas .

Table 3 showed the functional score and rank of hospital managers in each of the functional subareas, the hospital manager (H3) has gained the highest rank in all four areas of planning, leadership, organizing and controlling, respectively. While the lowest functional score and rank in the area of planning is related to the hospital manager (H8) and in other three areas, the hospital manager had gained the lowest rank. The functional status of the studied hospitals 'managers in the subarea of professionalism in Table 3 also shows that the hospital manager(H3) had the best efficiency among the surveyed managers in all four subareas of continuous improvement and education, organizational improvement and development, professional organizational behavior and professional individual behavior.

While the lowest performance in the three areas of improvement and continuous training, improvement and organizational development and individual professional behavior, belongs to the hospital manager (H8) .Table 3 shows the functional status of the hospital managers in humanistic sub-domain. Based on the results in the hospital manager (H3) has gained the highest score and functional rank in the three sub- areas of human safety, patient-orientation and relationship management and the hospital manager (H8) has gained the lowest score and functional rank

in all three human subareas. As well as the performance of the hospital managers in the organizational subarea showed in Table 3, the hospital manager (H3) has gained the highest score and functional rank in all four subareas of human resource management, information management, physical resources management and financial resources management. The lowest score and rank of the performance in three sub- domains of human resource management, information management and physical resources management belongs to the hospital manager (H8). The functional status of the hospital managers in individual sub-domains is shown in Table 3.It also indicates that the first functional rank belonged to the hospital manager (H3) in the all four sub-domains of perception, decision making, creativity and general personal characteristics. The lowest performance has been belonged to the hospital manager (H8). Overall performance, the hospital manager (H3) has gained the first functional rank within the ten hospital managers (performance score of 0.5860) and the hospital manager (H8) has gained the last rating (performance score of 0.2577), as well.

Discussion
Using the technique of Fuzzy AHP and expert opinions, were determined the importance and weight of each major and minor areas. The major and minor functional (duties) sub-domains achieved the highest and lowest weight, respectively.

In studies by Farzianpour and et al years 2009 to 2013 based on patterns of self-assessment, accreditation, Malcolm Baldrige Model, DEA and FAHP of directors of departments and hospitals of Tehran University of Medical Sciences had evaluated the performance of the organization and managers' ability to analyze and report data (1-6)

In a study by Avazpour (2013) to evaluate the employees' performance, after determining the employees' performance indicators using Fuzzy AHP, two indicators of personal characteristics and interpersonal relationships gained the highest weight, while in present study, the individual main domain has gained the lowest weight in comparison to other key areas of performance, however, the human scope that in different studies, has been usually considered as interpersonal relationships as well, has been ranked second in terms of importance and weight which it is relatively consistent with the intended study (20). The results of the study by Fang which calculated the weight of five main areas of middle health managers' competence using the hierarchical approach to analysis, shows that the personality domain and individual capabilities have achieved the highest and lowest ranks , respectively that the results of which are largely inconsistent with the results of this study (26).However, the difference in weight of some common indicators in different studies, was more because of the different experts have different views and perspectives in relation to the importance of performance indicators and it is quite normal. In addition, the performance of the hospital managers in Yazd Province was assessed through the questionnaire was designed for this purpose and using the Fuzzy AHPTechnique and results were separately presented for each of the major and minor functional areas and overall performance of managers. The empirical study results show that the Fuzzy AHP is practical approach to solve problems, especially when the performance criteria are vague and imprecise and in these cases, are recommended the Fuzzy Multi-Criteria Decision Making methods (27).

The case managers obtained different performance ranks in different areas of their performance. Managers of some hospitals had better performance according to the specified criteria, while some managers' situation was different that in some cases, the performance difference was remarkable. However, other studies have been conducted on the evaluation of the performance of managers and definition of managers' performance and competency indicators.

Dodger has conducted a study with the aim of developing appropriate performance evaluation indicators for hospital administrators and suggested the intended competence of managers in seven domains of planning, organizing and managing employees' performance, leadership, information management, clinical governance, resource management and performance indicators which has many similarities with the sub-domains of the proposed model in this study (14). This is probably due to the similarity of the mediums of these two research and social, cultural and other competencies needed by managers of both studies for better management of hospitals in Iran and this represents the high generalizability of the proposed model, especially for Iran.

Shams din in 2012 with a survey of over 358 managers of Health Sector in Malaysia, achieved the six areas of competence required for each manager. These include inspirational leadership, planning and evaluation, health promotion and disease prevention, information and communication management, collaboration and ultimately relationships that some of these competencies such as planning and evaluation, information and communication management are of sub-domains intended at the present study (28). In another study, Wongprasit presented a model of leadership competencies for managers of private hospitals in Thailand. In this study which was conducted in 2013, using the grounded theory approach and the snowball sampling and in-depth interviews with 30 managers of private hospitals in Thailand, 26 leadership competencies required by hospital managers have been proposed in 6 domains of 1-individual 2-managerial 3-people 4- medical 5- feeling a balanced management and 6- direction and guidance (16). In another study, Guo (2003) to introduce an evaluation tool for health development and management skills, has proposed three groups of interpersonal, information and decision making roles and six vital and important roles including leadership, communication, monitoring, strategic entrepreneurship, control and allocation of resources; for senior managers in the health sector (29).

Chadwell and Khadka in their study in 2012 which was conducted to assess the training needs of hospital managers in Nepal, assessed the opinions of 103 managers with different expertise from 31 hospitals. This study achieved six factors such as strategic management, financial management, service management, people management, information management and self-management (30). Anderson and Pulich focused on the role of traditional management functions and tasks including the four main task of planning, organizing, leading and controlling in enabling organizations to achieve their goals and classified the managerial competencies into 4 main managerial functional areas needed for all managers and supervisors in order to fulfill their roles in modern health care organizations (17). Studies were carried out, each of which dealt with different aspects of manager's performance that some of them are included in main areas of performance of this study and some others were among the sub-domains. According to all the words, it can be expected that the sum of the indices obtained in this study have a suitable integrity for use in other field areas and are applicable, as well. Strength of this study compared with similar studies, is having a comprehensive view while being specialized, to the performance of hospital administrators and the integration of Fuzzy Logic and Multi-Criteria Decision Making techniques in order to minimize the impact of the subjective nature of the subject on the main objective of the study.

However, this study also had limitations that among them are the need for attention to the type of hospital in terms of expertise and public and its potential impact on the manager's performance which the same affair necessitates studies with more details and taking into account the effect of variable the hospital type in the results of evaluating the performance of hospital managers. Another important point about the limitations of this study which refers to the subjective nature of evaluating the performance in which although efforts have been made to greatly solve this problem through integrating the Fuzzy Logic in techniques used in this study, however, their impact cannot be ignored.

Conclusion
Hospitals are of the most complex organizations in the current society and those who are appointed as director of this organization, should be merit-unique in order to better manage the complex and extensive activities of the hospital. In this study, using a set of qualitative and quantitative techniques, were provided criteria and indicators for assessing the performance of hospital managers and was investigated the performance of managers often hospitals in Yazd Province according to the proposed conceptual framework. In addition, the selected indicators are quite generalizable to be used in different areas of the health sector and by other health managers at different levels.

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Conflicts Of Interest
The authors declare that they have no competing interests

Table 1: Main functional dimensions and sub-domains of hospital managers

Main functional dimensions of hospital managers	functional sub-domains of hospital administrators
Functional: using a set of skills, abilities, means, procedures and techniques necessary to perform the main duties of a manager	Planning, Organizing, Leadership, Control.

Professional (professionalism): attempt to act on the opinions, values, ethics and individual and organizational principles and also trying to continually improve and further education	Professional individual behavior, Professional organizational behavior, Continual individual improvement and education,
Human: ability to establish effective interpersonal relationships which are essential to the working environment, communication networks, transmission and receipt of information or ideas clearly and effectively, and also try to understand concerns, feelings and thoughts of employees, patients and the society and valorize them and understand their needs to safety as a human	Patient-orientation (commitment to patient) , Communication Management, Human safety.
Organizational : The ability to correctly and optimally use of organizational resources including information resources, human resources, physical and financial resources	Information management and Information Technology, Human Resources Management, Financial Resources Management, Physical resource management
Individual : having positive personal characteristics both in terms of personality and complex mental abilities	General characteristics , Creativity and innovation, Analysis and cognition, Decision making

Table 2. Weight and rank of dimensions based on the experts' opinions using the hierarchical analysis

Main domains	Weight	Rank	Sub-domains	Weight	Rank
Functional	0.3735	1	Planning	0.2843	2
			Organizing	0.1438	4
			Leadership	0.3166	1
			Controlling	0.2553	3
Professionalism	0.1327	3	Individual professional behavior	0.1438	4
			Organizational professional behavior	0.3166	2
			Continual individual improvement	0.2553	3
			Organizational individual improvement	0.1610	1
Human	0.3123	2	Patient-orientation	0.3189	3
			Communication management	0.3477	1
			Human safety	0.3334	2

Organizational	0.1153	4	Information management and information technology	0.2105	3
			Human resources management	0.4293	1
			Financial resources management	0.2618	2
			Physical resources management	0.0984	4
Individual	0.0662	5	General characteristics	0.1977	3
			Creativity and innovation	0.1607	4
			Analysis and cognition	0.2557	2
			Decision making	0.3859	1

Table 3: Status and functional rank of the studied hospitals 'managers separated by the main functional areas

Hospitals	Areas	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
0.3735 Functional	di +	0.4577	0.3719	0.6229	0.3965	0.3333	0.3333	0.3888	0.2833	0.3526	0.3997
	di -	0.6248	0.7040	0.4611	0.6792	0.7577	0.7501	0.7073	0.8075	0.7328	0.6879
	Cci	0.4228	0.3456	0.5746	0.3686	0.3049	0.3076	0.3547	0.2597	0.3249	0.3675
	Rank	2	6	1	3	9	8	5	10	7	4
0.131 individual	di +	0.4454	0.3820	0.6623	0.3779	0.3104	0.3875	0.4147	0.2407	0.3307	0.4328
	di -	0.6403	0.6945	0.4147	0.6698	0.7649	0.6916	0.6685	0.8395	0.7515	0.6492
	Cci	0.4102	0.3548	0.6149	0.3512	0.2886	0.3590	0.3828	0.2228	0.3056	0.4000
	Rank	2	6	1	7	9	5	4	10	8	3
0.16 Organizational	di +	0.4694	0.3882	0.6594	0.4339	0.3225	0.3644	0.4496	0.2591	0.3468	0.4244
	di -	0.6132	0.6873	0.4203	0.6303	0.7642	0.7110	0.6310	0.8251	0.7367	0.6571
	cci	0.4336	0.3609	0.6107	0.4044	0.2967	0.3388	0.4140	0.2389	0.3201	0.3924
	Rank	2	6	1	4	9	7	3	10	8	5
0.11 Professionalism	di +	0.492	0.3867	0.6207	0.3883	0.3834	0.4143	0.4622	0.3148	0.3676	0.4576
	di -	0.5986	0.7014	0.4667	0.7067	0.7036	0.6782	0.6306	0.7856	0.7251	0.6292
	cci	0.4511	0.3554	0.5707	0.3566	0.3527	0.3792	0.4229	0.2860	0.3364	0.4210
	Rank	2	7	1	6	8	5	3	10	9	4

8.24 Human	di +	0.39 93	0.38 14	0.60 11	0.41 35	0.27 96	0.31 56	0.47 89	0.24 91	0.33 06	0.40 68
	di -	0.68 29	0.69 25	0.47 35	0.65 16	0.80 91	0.76 11	0.60 56	0.82 9	0.74 60	0.67 48
	ccl	0.36 89	0.35 51	0.55 94	0.38 82	0.25 68	0.29 31	0.44 16	0.23 10	0.30 70	0.37 60
	Rank	5	6	1	3	9	8	2	10	7	4
Total	di +	0.46 92	0.38 43	0.63 44	0.40 42	0.33 70	0.38 14	0.44 88	0.28 10	0.35 39	0.43 51
	di -	0.61 74	0.69 72	0.44 81	0.67 53	0.75 03	0.70 28	0.63 91	0.80 93	0.73 32	0.64 96
	ccl	0.43 18	0.35 53	0.58 60	0.37 44	0.30 99	0.35 17	0.41 25	0.25 77	0.32 55	0.40 11
	Rank	2	6	1	5	9	7	3	10	8	4

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