



Allocation of Health Resources According To the Type and Size of Iranian Governmental Hospitals

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Abstract

Background: Due to consuming about 50%-80% of health resources, hospitals are the greatest and costly operational units in Iranian Health system. so allocation of resources specially human and space resources as the most expensive ones is really important for further controlling of costs, analysis of costs and making suitable policies for increasing the profitability and allocation of resources and improvement of quality.

Method: This paper intends to describe and analyze any allocation of resources in 530 university hospitals in Iran. The final goal of this research is to provide a data bank according which there is a basis for more scientific budget allocation of state's hospitals from the size and type of application points of view.

Results: The relevant index of person to bed was 2.04 for human resources. All hospitals more than 300 beds are located in benefiting areas from which 17 cases are educational and 2 cases are therapeutic. This is necessary to mention that the rate of management group forces to total personnel at deprived areas is about 2.5% more than benefiting areas.

Conclusion: Because 60-80% of hospital costs are applied for human forces, all managers of hospitals are obliged to revise their policies in attraction and employment of human force in order to benefit from such a valuable resource and prevent from expensive costs. So any employment of personnel should be based upon real needs of hospital.

Keywords: Hospital, Human resource, Space resource, Iran

Introduction

Due to ever rising environmental complexities, optimized consumption of resources and increasing of profitability in health organizations changed into the center of managers' attention (1).

As the greatest and costly operational unit of health system, hospitals are really important because of consuming about 50%-89% of total health resources. There are different questions about manner of allocation and consumption of resources by hospitals (2). About 40% of govern-

mental health expenses are related to hospital care in Iran (3, 4). Hospitals especially in developing countries are recognized by non-efficient management of resources, low profitability, submission of non-friendly & non-professional services, non-reflective hierarchy organizational structure and lack of encouragements based upon the function (5). Such a weak management of hospitals may lead to wasting resources (6).

Furthermore there are lots of problems for hospitals including management of financial affairs, daily costs, hospitalization period, and optimized applying of resources, distribution of facilities, optimized allocation of resources and active beds, physical space and correct localization for facing these problems (7). As a result the mentioned items are the most important and effective factors on costs, income and other economic indexes of hospitals where human resources costs are the major part of total hospital costs as well (4). According to all researches and standards, human force costs are about 55%-60% of total operational costs of hospitals. It is so much important to evaluate human force of related hospitals of affiliated MOHME from different viewpoints of financial programming and human resources. It is the center of attention of health system policy makers. The result is enabling policy makers of hospitals and financial fields and human force of ministries and universities to increase the income and reduce the costs by scientific transparency and human force situation (8).

Regarding the shortage of current information in country and lack of benefiting from a routine collection & analysis of data and pursuant to article 5 of operational budget and according to the article 88 of 4th development plan, any optimized consumption of resources and increasing the profitability is really considerable for government and different organizations including Ministry of Health and Medical Education (9).

This study is conducted to describe and analyze any allocation of resources at different groups of governmental hospitals from the size and type of application points of view.

Methods

The final goal of this research is to provide a data bank according which there is a basis for more scientific budget allocation of state's hospitals.

Selection of hospitals

This study is made for all university hospitals as the inclusion criteria. Therefore following five folds criteria have been explained for entrance of

hospitals to the research: dependency to one of Medical Sciences Universities, educational and/or therapeutic situation of hospital with any number of beds, benefiting from required infra structures for applying of web software, further access to the required classified information for entering into web software and cooperation & readiness for submission of information

From total 530 university hospitals about 150 ones were concerned in expert panel and in compliance with above-mentioned five folds situations.

Data collection

First step: Designing Online forms for data collection

Data were collected through web software which has been designed in 2007. This software has 9 major tables as follows: Human force, Utilized physical spaces, Situation of active beds, List of total current costs, Situation of cash incomes, Situation of non-cash incomes, Received credits by hospital, Hospitalization & patients' information and List of civil costs.

Second step: Filling the forms

We prepared some manuals for providing a common & understandable language and an exact description of research group about a considered subject for all hospitals. They have been requested to insert relevant information about their own hospitals in mentioned forms with online basis. Upon termination of this step, members of research group started to evaluate all required information as well. In case of any defects or wrong information, they contacted with relevant university and/or hospital in order to make complete the same. In spite of all estimations, again there were some incomplete forms which have been omitted from our study. Finally we evaluated relevant forms of 139 hospitals as well.

Third step: Data analysis

Data analysis was performed after inspection and confirming the correctness of data by SPSS software. This is necessary to focus that any analysis and description of situation was based upon allocation the credits as followings indexes:

Human force with separation of type & academic records, job group, share of this force in benefiting/deprived areas, educational/therapeutic hospitals and different criteria of hospitals (Below 50 beds (Group A), 51 to 150 beds (Group B), 151 to 300 beds (Group C) and over 300 beds (Group D)).

Relevant concerned indexes in the field of physical space include: Metering index for one bed, occupied force and one hospitalized person.

Hospital costs have been collected with separation of current costs and civil costs. From among all current & civil costs, we have concluded relevant costs of maintenance hospital spaces such as consuming water/ electricity, heating fuel, construction contract and building rent in current costs and relevant costs of repairs and maintenance of

equipment, building and construction in civil costs accordingly.

Results

With regard to the results of this study as mentioned in Table 1, number of hospital, human force and number of beds displayed in 4 groups of concerned hospitals from different points of view of educational/non-educational and deprived criteria. Regarding this table the most considered hospitals are related to 51 to 150 beds. All hospitals of group D (More than 300 beds) are located in benefiting areas from which 17 cases are educational and 2 cases are therapeutic. Furthermore it is obvious the share of human force in hospitals of groups C & D are equal in presence of different beds.

Table 1: Research hospitals according to their situation and size

		Deprived		Benefiting		Benefiting & Deprived		Total percentage	
		Edu	Therap	Edu	Therap	Edu	Therap		
Hospitals	Up to 50beds	Hospitals	0	12	2	9	2	21	16.5
	-Group A	Personnel	0	972	188	847	188	1819	4.2
		Beds No	0	349	75	284	75	633	3
		Hospitals	3	15	18	25	21	40	43.9
	51 to 150beds - Group B	Personnel	759	2720	4693	5357	5452	8077	28
		Beds No	317	1334	2086	2579	2403	3913	26.7
		Hospitals	2	2	26	6	28	8	25.9
	151 to 300beds - Group C	Personnel	699	846	12275	2086	12974	2932	33
		Beds No	409	350	5748	1182	6157	1532	32.5
		Hospitals	0	0	17	2	17	2	13.7
	301beds and over - Group D	Personnel	0	0	16419	377	16419	377	34.8
		Beds No	0	0	8111	850	8111	850	37.8
Hospital		3.6	21	45.3	30.1	49	51		
Personnel		3	9.4	69.6	18	72.6	27.4		
Percentage	Bed	3.1	8.6	67.7	20.6	71	29		
	Hospital	24.6		88.3					
	Personnel	12.4		87.6					
	Bed	11.7		88.3					

Human resources index has been displayed in Table 2. The highest statistics is centralized in nursing & obstetrics human force group. Furthermore the rate of supporting forces (managerial & services) to total forces is about 30%, it is a sign of

lack of mechanized methods and internal controls in hospitals, lack of H.I.S system, oldness of hospitals, old equipment and so on may cause a compression of supporting force at hospitals with no more attention in this study.

Table 2: The situation & academic level of five folded groups of human forces

Description of human force group	PHD, Specialist and over	General doctor	Master of Science	Bachelor of science	Associate Degree	High school diploma	Below high school diploma	Grand total
Medicine	3332	1290	0	0	0	0	0	4622
Paramedical science	143	0	287	2962	2975	0	0	6367
Nursing & Obstetrics	2	0	422	14845	1934	4472	1542	23217
Management field	10	49	61	1089	423	1734	561	3927
Services	0	0	25	419	177	3519	5965	10105
Grand total	3487	1339	795	19315	5509	9725	8068	48238

Considering the results of this study in different hospitals located at benefiting areas there is about 2.5% more therapeutic staff (Doctors, paramedical specialists, nurses and obstetrics) than deprived areas from which the highest rate is related to nursing and obstetrics group. This is necessary to mention that the rate of management group forces to total personnel at deprived areas is about 2.5% more than benefiting areas (10.3% of total personnel at deprived areas and 7.8% at benefiting ones).

Considering the index of persons to the bed, about 29% of persons to bed are supporting forces, 48% are nurses and obstetrics and the remained are related to medicine and paramedical sciences group which is about 23%. In addition the rate of person to bed of special staff (that means general doctors, specialists, PHD and higher) is about 0.2 persons.

The person to bed at hospitals located at deprived areas is more than benefiting ones (2.17 persons against one bed). Since the rate of servicing forces to total personnel is fixed for both mentioned items (21%) and the rate of therapeutic staff is lower in deprived areas hospitals, this is a sign of for compression in these areas and related to managerial group forces. In other words we are

facing with additional number of managers at deprived areas. Generally we can say that the rate of person to total bed, therapeutic staff and supporting staff will be reduced with increasing the number of beds.

Another important comparison with special importance is considering the index of bed at deprived and benefiting hospitals which is somehow equal. Estimation of this index at other hospitals with different number of beds could be responding to ost questions and wage items related to the size and criterion of hospital. Therefore regarding the results of this study, it is possible to say that upon increasing the number of beds at any hospitals belonging to groups A to D, there is a betterment in occupation percentage of beds (58.6-63.4% -31.4- 51.6%). This is necessary to mention that all hospitals of group A (Below 50 beds) have the minimum percentage of bed occupation.

Related to allocation of physical space of affiliated hospitals of Ministry of Health, it is possible to say that there is averagely about 22,35,56,33 sqm therapeutic space at the hospitals of First to Fourth groups (from the number of beds point of view) and about 77,71,152,67 sqm for non-therapeutic space.

Also the allocated metering for each bed is respectively 347, 144, 294, 600 sqm at hospitals of groups A to D while such an index in building is

respectively for 104, 87, 100, 251 sqm as well (Table 3).

Table 3: Information about number of beds and physical space of hospitals according to the type of hospitals

Description	Educational hospital				Therapeutic hospital				Grand total			
	Number of hospital	Number of beds	% of beds	Physical space (sqm)	Number of hospital	Number of beds	% of beds	Physical space (sqm)	Number of hospital	Number of beds	% of beds	Physical space (sqm)
Deprived	5	726	4,3	60,856	29	2033	29,3	1,102,552	34	2,759	11,7	1,163,408
Benefiting	63	16,020	95,7	3,025,231	42	4,895	70,7	782,772	105	20,915	88,3	3,808,003
Total	68	16,746	100	3,086,087	71	6,928	100	1,885,324	139	23674	100	4,971,412
Percentage	49	71	100	-	51	29	100	-	-	-	-	-

Regarding the mentioned data in Table 4 we have the per capita metering of physical spaces for one bed at the hospitals located at benefiting areas

somehow lower than those at deprived areas. The minimum metering of physical space for one bed was for the hospitals of third group.

Table 4: Metering rate indexes to the beds, occupied force and hospitalized persons

Description	Educational	Therapeutic	Benefiting	Deprived	Below 50 beds	51 to 150 beds	151 to 300 beds	300 beds and over
Metering per capita to one bed	184.3	272	182	422	1098	208	106	231
Metering per capita to occupied force	88.1	143	90	194	387	97	51	123
Metering per capita to one hospitalized person	11.6	2.7	2.8	3.7	19.5	2.2	3.1	3.7

According to the results mentioned in Table 4 there is about 9.9 persons against 1000sqm of managerial / administrative space and also 29.2 persons from special medicine, paramedical and nursing /obstetrics forces for 1000sqm of therapeutic space as well. Furthermore there were 4.3 persons of servicing forces against 1000sqm from total building of hospitals responsible for maintenance duties.

Instead of one active bed there is a minimum rate of occupied force at hospitals of 4th group (1.9

persons) and highest rate of which at hospitals of 1st group (2.8 persons).

Any evaluation of other physical spaces including surgery room and delivery and recovery (except for emergency, pharmacy and clinic) shows the current shortage at deprived areas in comparison with benefiting ones.

Table 5 shows that any increase in per capita of one active bed may lead to an increase in maintenance costs of hospitals. Therefore with regard to the high per capita of the building, all hospitals of first group had great amounts of maintenance

costs. Upon development of first group hospitals to third one there is an economy of more than 12.1% in maintenance costs. Therefore there is an economy in relevant costs of physical spaces as

well. Furthermore all hospitals of 4th group against 1st one may apply 34% lower occupied forces against one bed accordingly.

Table 5: List of maintenance costs of physical space with separation of hospital groups (Unit: Rls. 1000)

Description	List of costs	Below 50 beds	51 to 150 beds	151 to 300 beds	300 beds and over
Civil	Repair and maintenance of equipment	1988480	5190022	4533426	10963844
	Repair and maintenance of building and constructions	761922	10341727	4533426	10963844
Second chapter	Consuming water	740602	29446987	4958647	7247518
	Consuming electricity	1133543	5133493	6113726	4539163
	Fuel	502259	4548514	2263986	3543979
	Construction contract	3322817	13623774	26153978	30609006
	Servicing contracts (Special job, special volume and ...)	18757240	166775240	217800238	242069694
Third chapter	Rent	315510	553891	302508	306000
Total of maintenance costs		27482373	235613647	266989935	310243048
Total of building costs		425113	1857310	1108762	3113058
Maintenance costs index to total physical space (Building)		64	126	240	100
Number of beds		708	6316	7689	8961
Share of maintenance of one bed		38816	37304	34724	34621

Discussion

According to the present results the relevant index of person to bed was 2.04 for human resources who may show that how much we should make economy for providing a ready & accessible hospital bed for further health, recognition of disease and other services. It means that instead of one active bed there is 2.04 personnel including medical group, nursing, servicing and so on. Furthermore upon the increase of hospital beds there will be improvement in per capita of person to bed and occupation rate. It means that increasing of hospital size may assist in improvement of hospital efficiency. Also the operation index in therapeutic hospitals is better than educational ones and may confirm the low quality of educational hospitals. We have the function rate and occupation of bed lower than standard level in above-mentioned study which is specific in those

hospitals with lower 50 beds. Since all hospitals are active with low capacity, it is obvious to find considerable empty beds. Since there is affixed nature at hospitals from behavior view point and for about 70% of operational costs, therefore it is necessary to revise the ideals of hospitals with lower than 50 beds.

Since there is a negative production Elasticity of non-therapeutic personnel in this study, it may show that final production is negative as will accompanied with a reduction in general production (10). Then in case of free of charge deposits any application of which is not economic due to reducing of products. For this purpose and according to the findings the rate of 29.1% of supporting personnel will confirm a negative effect of force compression at supporting units than services. It is necessary to have a more careful study of any reasons for high rate of supporting forces.

Harrison estimated the additional number of human force in 2004 at USA about 9065 cases. He focused that any re-distribution of human force at hospitals according to the facilities and aerial needs and also training of human force and providing of required motivations for betterment of skills of key special forces may cause higher rates of their efficiency (11). With regard to an increase in medical staff to total personnel at hospitals of group A to D there will be a reduction in the rate of special staff (medical group) to total forces which is not suitable due to the further effects of hospital incomes out of medical group. Therefore it is necessary to provide required facilities for employment more medical personnel (12). We are facing with additional managerial forces at relevant hospitals at deprived areas than benefiting ones. Any higher level of persons per capita to the number of bed at educational hospitals is resulted from higher rate of therapeutic staff to total in comparison with therapeutic hospitals as well.

With regard to the finding of physical space in this study, most hospitals of 1st group with more physical space had higher maintenance costs than other groups. Furthermore all hospitals of group B (50-150) may find generally more space in both therapeutic and non-therapeutic sections. But any allocated space to one bed at smaller hospitals is more than greater ones. Therefore with regard to lower efficiency of these hospitals it is not logical to have such an area as well.

Generally about further economy in resources and costs it is possible to say that upon reducing the costs of personnel there will be an additional reduction of costs due to increasing the number of beds at hospitals (development of hospitals from 1st to 4th group). As a result the mentioned hospitals will benefit from the output against the concerned criteria. Stinz et al. consider the final goal of hospital allocation resources is to provide justice and equal access of all including benefiting and/or deprived groups. Therefore pay attention to this item is an important part of governmental activities in the field of increasing social welfare as well (13).

In 2006, Mahapathra stated one of the reduction ways about 33% of total human force allocation and physical resources at Indian hospitals is combination of hospital services (14). Furthermore Tarricone et al. considered an active program for allocation of resources and establishment a research/development unit at hospitals as the important factor in optimized allocation of sources (15).

Considering optimized allocation of human resources, Darvish et al. believe that benefiting from smart systems and model making and further researches are useful tools in time tabling and allocation of personnel at hospitals (16).

Generally there are following comments with regard to the results of this study:

- Any employment of personnel should be based upon real needs of hospital and according to the results of all scientific studies in this field
- Study of environmental conditions before establishment of hospital especially from the point of view of number of patients in a society in which the hospital is active
- Benefiting from work measuring methods in order to have useful benefits from human force and with regard to the volume of hospital functions
- Increasing the attraction rate of financial resources by managers
- Exact evaluation for optimized allocation of beds and clinical services for hospitals for ensuring about further access to necessary services for all people by policy makers of health.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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