Comprehensive evaluation of medical service ability of TCM hospitals from 2013 to 2017

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Abstract. Purpose: This paper evaluates the medical service ability of TCM hospitals to provide reference for promoting the improvement of medical service ability. Methods: Entropy weight TOPSIS method and RSR method are used to evaluate the medical service ability of TCM hospitals from 2013 to 2017. Results: The development trend of the medical service ability of TCM hospitals from 2013 to 2017 is good, but the efficiency of medical service is low, and the service ability of TCM preventive treatment of diseases needs to be improved. Conclusion: It is suggested that effective measures should be taken to improve the medical service ability of TCM hospitals, including optimizing bed allocation and improving the efficiency of medical service; intensifying propaganda efforts to enhance the service ability of TCM preventive treatment of diseases, etc.

1. Introduction

TCM hospitals are the main providers of Chinese medical services and they are an important part of the cause of TCM [1]. In recent years, with the increasing of the policy support and financial input from governments, the level of medical services in TCM hospitals has been significantly improved. Scientific and objective evaluation of medical service ability in hospitals is an important link to improve the level of medical service in hospitals. In this study, the Entropy Weight TOPSIS method and RSR method are used to evaluate the medical service ability of TCM hospitals from 2013 to 2017, providing a reference for promoting the improvement of medical service ability.

2. Data sources and methods

2.1 Data sources

The data of this study is from the *statistical extracts of TCM throughout the country*, *China health and family planning statistical yearbook*, and *China health statistical yearbook*.

2.2 Research method

Min-Max normalization method is used to process the original data, in order to achieve the same trend and normalization of evaluation indicators. Using entropy weight method to determine the weight of evaluation indicators, based on this, combining TOPSIS method with RSR method to evaluate the medical service ability of TCM hospitals [2].

2.3 Statistical analysis

Excel 2010 and SPSS 19.0 software are used to analyze the data. In the regression analysis, P<0.05 is considered as statistically significant difference.

3. Comprehensive evaluation results of entropy weight TOPSIS method and RSR method

3.1 Establishment of indicator system

On the basis of literature analysis, according to the availability and completeness of data and following the principles of scientificity, representativeness, comparability and operability of the evaluation indicator system, the evaluation indicator system of medical service ability of TCM hospitals with five dimensions is established (refer with: Table 1).

Table1. The evaluation indicator system of medical service ability of TCM hospitals

Dimension	Index	Index direction	Variable
Medical service facilities	Number of TCM hospitals per 10,000 people	+	X1
	Number of beds per 10,000 people	+	X2
	Year-end housing construction area (hm²)	+	X3
Medical human resources	Number of practising (assistant) doctors per 10,000 people	+	X4
	Number of registered nurses per 10,000 people	+	X5
	Number of pharmacists per 10,000 people	+	X6
Medical service volume	The total number of outpatients	+	X7
	The number of discharged patients	+	X8
Efficiency of medical services	Rate of utilization of hospital beds（%）	+	X9
	Average length of stay for discharged patients	-	X10
	Daily visits each doctor	+	X11
Characteristic services of TCM	The number of TCM preventive treatment of diseases	+	X12
	Year-end TCM preparation room area (hm²)	+	X13
	Number of TCM diagnostic and therapeutic equipment over 5000 yuan at the end of the year	+	X14

3.2 Raw data collection

After sorting out the collected data of each indicator, the raw data table of evaluation indicator of medical service ability in TCM Hospitals from 2013 to 2017 can be obtained (refer with: Table 2).

Table2. Raw data table of evaluation indicator of medical service ability in TCM hospitals from 2013 to 2017.

Year	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
2013	221.6	44744.2	4105.7	16178.8	17764.3	3649.9	43726.3	1815.7	88.6	10.1	7.9	1810.8	57.2	103691
2014	228.6	48809.1	4338.5	16990.2	19633.1	3818.7	47164.2	2001.5	87.3	10.0	8.2	1464.6	60.6	110417
2015	237.7	52043.0	4717.1	18043.3	21286.5	3924.9	48502.6	2091.5	84.7	9.9	7.8	1445.3	63.6	119708
2016	250.4	55091.5	5063.5	19183.8	23198.6	4099.6	50774.5	2270.4	84.9	9.8	7.7	1551.6	70.3	133598
2017	265.8	58861.1	5521.1	20428.9	25147.6	4213.9	52849.2	2481.9	85.0	9.6	7.4	1784.1	73.1	142559

3.3 Empowerment results with entropy weight method

Using entropy weight method to determine the weight of each evaluation indicator (refer with: Table 3).

Table3. Entropy value and weight of each evaluation indicator

Dimension	Indicator	Entropy	Weight	Dimension weight
Medical service facilities	X1	0.7511	0.0749	0.2049
	X2	0.8057	0.0585	
	X3	0.7627	0.0715	
Medical human resources	X4	0.7727	0.0684	0.1893
	X5	0.7943	0.0620	

	X6	0.8043	0.0589	
Medical service volume	X7	0.8215	0.0538	0.1157
	X8	0.7944	0.0619	
Efficiency of medical services	X9	0.5780	0.1271	0.2503
	X10	0.7709	0.0690	
	X11	0.8199	0.0542	
Characteristic services of TCM	X12	0.6695	0.0995	0.2398
	X13	0.7722	0.0686	
	X14	0.7618	0.0717	

3.4 The results of sorting and classification

Combining TOPSIS method with RSR method to determine the distribution of RSR (refer with: Table 4)

Table4. Distribution of RSR of medical service ability in TCM hospitals from 2013 to 2017

year	D_i^+	D_i^-	C_i（RSR）	sorting	f	$\sum f$	R	$\bar{R}$	P_i	Probit
2014	0.7300	0.3897	0.3481	5	1	1	1	1	20	4.1584
2015	0.6846	0.3917	0.3639	4	1	2	2	2	40	4.7467
2013	0.8525	0.4977	0.3686	3	1	3	3	3	60	5.2533
2016	0.4949	0.6264	0.5586	2	1	4	4	4	80	5.8416
2017	0.4038	0.8975	0.6897	1	1	5	5	5	95	6.6449

Through correlation and regression analysis, C_i and probit have a high correlation (r=0.934). The regression equation is C_i=-0.320+0.147*Probit. The results of variance analysis show that F = 20.374, P < 0.05, which indicates that the regression equation has statistical significance. The medical service ability of TCM hospitals from 2013 to 2017 is divided into three grades according to the predicted value (refer with: Table 5).

Table5. Sorting and classification of RSR of medical service ability in TCM hospitals

level	P_x	Probit	Ci	classification
Lower	$<P_{15.866}$	<4.00	<0.2680	~
Middle	$P_{15.866}$~	4.00~	0.2680~	2016、2013、2015、2014
Optimum	$P_{84.134}$~	6.00~	0.5620~	2017

4. Discussions

4.1 Weight analysis

In terms of dimension weight, the weights of medical service efficiency and characteristic services of TCM are larger, 0.2484 and 0.2380 respectively. It shows that medical service efficiency and characteristic services of TCM play a key role in the five dimensions of the evaluation indicator system of medical service ability in TCM hospitals. Therefore, improving the efficiency of medical services and the ability of characteristic services of TCM is very important to improve the overall medical service ability.

In terms of indicator weight, the rate of utilization of hospital beds and the number of TCM preventive treatment of diseases at the end of the year have a larger weight, which indicates that improving the rate of utilization of hospital beds and increasing the number of TCM preventive treatment of diseases have a significant effect on improving the medical service ability in TCM hospitals.

The rate of utilization of hospital beds is an important indicator for evaluating medical efficiency. It is stipulated in the construction standard of TCM hospitals that the rate of utilization of hospital beds should be 85%~93% [3]. However, the data in table 2 shows that the rate of utilization of hospital beds in TCM hospitals decreases first and then increases during2013-2017, and it is lower than 85%

in 2015-2016. In 2017, it only reaches the lowest standard. This shows that there are many idle beds in TCM hospitals in recent years, and the waste of medical resources still exists. This may be related to the imperfect hospitalization process and the low level of hospital internal management [4].

The growth rate of the number of TCM preventive treatment of diseases at the end of the year is -1.47% and average annual growth rate is -0.30% in 2013-2017. At the end of 2017, it accounts for only 3.38% of the total number of outpatients. The main reasons may be as follows: (1) Because of the lack of strong policy support in the process, the development of preventive health care services of TCM (TCM preventive treatment of diseases) have been limited. (2) The construction and management of the TCM preventive treatment of diseases section in TCM hospitals are not standardized enough, and the service ability and level of TCM preventive treatment of diseases need to be improved. (3) The propaganda of the concept of TCM preventive treatment of diseases is not in place, the level of the social cognition and recognition is low.

4.2 Analysis of comprehensive evaluation results

The ranking results based on the entropy weight TOPSIS method show that the value of C_i decreases first and then increases in 2013-2017, ranking second and first in 2016 and 2017 respectively. The classification results based on the RSR method show that the medical service ability of TCM hospitals in 2013-2016 is in the middle level, then, the service ability reaches the optimum level in 2017. To sum up, the overall development trend of medical service ability of TCM hospitals is good from 2013 to 2017.

5. Suggestions

5.1 Optimizing the allocation of the bed in TCM hospitals to improve medical service efficiency

The efficiency of medical service in TCM hospitals has a far-reaching impact on the development of the whole cause of TCM [5]. With the vigorous development of "Internet+ TCM", TCM hospitals should adapt to the development of the times, and optimize the medical service flow with modern technology. In this way, the waiting time of patients' examination can be shortened, the number of patients hospitalized can be reduced, and the turnover of beds can be quickened. At the same time, TCM hospitals should strengthen the internal management of them, dynamically adjust the beds of clinical departments according to the actual use. The purpose is to avoid wasting of beds resources, improve the rate of utilization of hospital beds and the efficiency of medical services.

5.2 Taking effective measures to improve the service ability and level of TCM preventive treatment of diseases

The government should give certain protection and preference to the preventive health care service items of TCM preventive treatment of diseases in policy-making. TCM hospitals should strengthen the standardized construction and scientific management of the TCM preventive treatment of diseases section, and improve the service ability of TCM preventive treatment of diseases. In addition, TCM management departments and hospitals can strengthen the propaganda of the concept of TCM preventive treatment of diseases with wechat public number, mobile app, television, newspapers and other ways, so as to improve the social awareness and recognition of it.

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