Research on the Construction of Comprehensive Evaluation Index System of Private Hospitals

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Abstract: Comprehensively considering the Donabedian model and the concept of core competitiveness, this study uses the index screening model, literature research method, and Delphi method to establish a comprehensive evaluation index system for private hospitals that is consistent with the current stage of development in China. Calculate the index weight and determine the evaluation criteria. The index system includes 4 first-level indexes, 9 second-level indexes, and 25 third-level indexes, including not only the medical quality evaluation of private hospitals themselves as medical institutions, but also the core competitiveness evaluation of private hospitals with the basic characteristics of enterprises. In the hope of promoting the sustainable and high-quality development of private hospitals.

1 INTRODUCTION

With the continuous improvement of the people's pursuit of medical quality, how can private hospitals adapt to the requirements of medical and health services in the new era, how to achieve healthy and rapid development, the deep-seated problems arising from this urgent need for us to explore. In recent years, the support that nation gives to private hospital has increased every year. However, the development of the private hospital is still relatively difficult, comparing with the public hospital which has long history and strong government investment (Zeng 2018). Private hospitals need competitiveness for better development. Consequently, the evaluation of private hospitals should include not only the medical quality evaluation of private hospitals themselves as medical institutions but also the core competitiveness evaluation of private hospitals with the basic characteristics of enterprises. Under the background of the "Healthy China" strategy, the construction of comprehensive evaluation index system of private hospitals is worth further study.

1.1 Medical Quality Evaluation

The main purpose of medical quality evaluation is to help each medical institution accurately understand the current situation and changing trend of its own medical quality management, especially the gap between it and the leading units of medical quality, so that it can realize the loopholes and deficiencies in the hospital quality management and carry out the corresponding measures (Jiao 2015).

The Donabedian model was proposed by Avedis Donabedian, the father of American medical quality management, in 1968. It measures medical quality with three dimensions of "structure-process-result" (Ayanian 2016). Since then, it has been widely used in the field of medical quality research and practice, and this evaluation framework has been formed, that is, the medical quality is divided into three parts: basic condition quality, work link quality and end-of-service quality. Jiao, X. et al. use the literature study, focus group method, Delphi method, and balanced score card theory to develop a set of indexes for assessing medical quality of tertiary hospital (Jiao 2015). Wang, H. S. et al. use IOM model and Donabedian model, the inductive method and deductive method. A comprehensive evaluation index system of medical quality in modern hospitals in China is constructed (Wang 2019).

1.2 Core Competitiveness Evaluation

With the increase of medical service providers and the development of economy and society, the

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competition of medical service market is becoming more and more intense. The people have higher and higher requirements for the quality of medical services. The development of private hospitals increasingly requires core competitiveness. The core competitiveness of an enterprise refers to the unique and inimitable ability of an enterprise that can support its competitive advantage (Qian 2018).

Han, Q. X. et al. start from the concept of hospital core competitiveness, and construct an evaluation index system for the core competitiveness of Chinese hospitals, including social reputation, health resources and hospital development potential (Han 2015). Gong, H. X. et al. use the entropy TOPSIS method, taking nine cities in Pearl River Delta as research objectives to construct an evaluation index system of private hospitals competitiveness, and determine the index weight (Gong 2016). Jia, Y. et al. use the range transformation method, entropy value method, and TOPSIS method to standardize index, determine index weight and evaluate the competitiveness of ten private hospitals in Dalian (Jia 2016). Qian, Y. Y. Z. uses the literature analysis and Delphi method to construct the evaluation system of private hospital core competitiveness, through AHP to determine the weight of each index. And it establishes the fuzzy matrix judgment model to evaluate the core competitiveness of three private hospitals in WE area (Qian 2018).

In summary, the existing researches mainly use the literature method and Delphi method construct the private hospital medical quality or core competitiveness evaluation index system, by using entropy TOPSIS method to determine the index weight and evaluate the competitiveness, the countermeasures are put forward. However, most studies only take individual private hospitals as research objects, only evaluate medical quality, or only evaluate core competitiveness. A unified, scientific, and effective comprehensive evaluation index system for private hospitals has not yet been formed.

This study hopes to promote the sustainable and high-quality development of private hospitals by establishing a comprehensive evaluation index system for private hospitals in line with China's current development, including not only the medical quality evaluation, but also the core competitiveness evaluation.

2 RESEARCH METHODS

2.1 Basic Model Selection

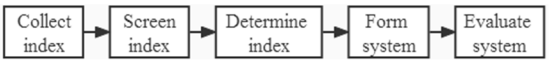

Figure 1: Index screening model.

This research uses the relatively common index screening model, see Figure 1. This model is suitable for a large number of indexes that already exist before the system is built, but the indexes are scattered and disordered. It is necessary to collect indexes and then classify and filter them. After the system is formed, its scientificity and practicability are evaluated. Attention must be paid to the availability, specificity and reliability of index screening. The finalized index needs to be clearly defined and describe how the index is calculated.

2.2 Literature Research Method

Collect the academic papers related to the evaluation indexes of private hospitals, and select them according to the inclusion-exclusion criteria and research purpose. Establish the frequency table of each level index of the index system. According to the frequency table, the indexes with higher frequency are selected for preliminary screening, and the initial framework of the index system is formed.

2.3 Delphi Method

According to the results of literature screening, five people including relevant university scholars, private hospital operators, and medical institution managers are organized to carry out expert consultation, to remove unreasonable indexes and add missing important indexes, improving the scientificity and practicability of the index system. To make the expert consultation results more scientific, we evaluate each index from three aspects: importance, operability, and sensitivity.

3 RESULTS

3.1 Establish Evaluation Index System

First, collect academic papers related to the evaluation indexes of private hospitals. Most of the literature is retrieved from the China Biomedical Literature Database (CBMdisc), China National

Knowledge Infrastructure (CNKI), Database of Chinese sci-tech periodicals (VIP), and WanFang Database. Other information is retrieved from the website of the National Health Commission of the PRC, the website platforms of provincial health departments, and related foreign websites.

Carry out a fuzzy search with the theme of "competitiveness of private hospitals, performance of private hospitals, and quality of private hospitals", and then limit the titles or abstracts or keywords to contain "index" or "evaluation index system" for fuzzy search. By manually reading the titles and abstracts, filter out the literature related to the evaluation index system of private hospitals in the past 5 years and download the full text. 306 articles are obtained. Conduct preliminary screening based on inclusion-exclusion criteria and research purpose, and then the articles are browsed and discussed, and finally 57 articles involving the evaluation indexes are selected.

Second, create a literature information extraction table. Collect the basic characteristics of literature, including research time, research source, research object, research category, and research fund source. Based on further screening of the literature, the relevant contents of the evaluation index system of private hospitals in the literature are collected, including index types, methods, and dimensions of establishing the evaluation system.

Third, establish the frequency table of indexes at all levels of the index system. There are 5 first-level indexes and 119 third-level indexes. The indexes with higher frequency are selected, and then compared with policy documents and discussed, 4 first-level indexes and 72 third-level indexes are reserved. The initial framework of the index system is formed.

Fourth, conduct expert consultation on the index system. According to the initial framework of the index system, an expert consultation form is formed, and the expert consultation questionnaire is distributed to relevant university scholars, private hospital operators, and medical institution managers to collect relevant results.

Finally, according to the results of expert consultation, calculate the mean value, standard deviation, and coefficient of variation of the indexes. After two rounds of discussions, combined with the actual work development and recent development goals. The comprehensive evaluation index system of private hospitals includes 4 first-level indexes, 9 second-level indexes, and 25 third-level indexes.

3.2 Calculate the Weight

3.2.1 Degree of Expert Authority

The degree of expert authority of the expert consultation is detailed in Table 1. The calculation formula is Cr=(Ca+Cs)/2, in which Ca and Cs are calculated by assigning points. The authority coefficients of the four first-level indexes are all greater than 0.70, which indicates the higher degree of authority of the expert.

Table 1: Degree of expert authority score table.

	Judgment coefficient (Ca)	Familiarity coefficient (Cs)	Authority coefficient (Cr)
Social reputation	0.82	0.74	0.78
Medical service capacity	0.88	0.88	0.88
Financial operations and management capability	0.90	0.80	0.85
Development potential	0.84	0.70	0.77

3.2.2 Weight Calculation Results

The results of the weight calculation are shown in Table 2.

3.2.3 Determine the Evaluation Criteria

First, the index base is established on the basis of reading literature and relevant national policy documents. And the preliminary evaluation index system is determined through expert consultation.

Second, the weighted average method is used to calculate the weight of each index. The importance score of each index is multiplied by the authority coefficient of each expert to get the weighted score. Then calculate the weighted average of each index, and get the actual score after a series of mathematical conversion calculations.

Finally, with reference to the relevant criteria in the policy document and the actual situation, the detailed scoring criteria for each index are calculated. See Table 3.

The national standards are derived from "Private Hospital Evaluation Standards Implementation Rules (2016 Edition)".

Table 2: Comprehensive evaluation index system of private hospitals.

First-level index	Point value	Second-level index	Point value	Third-level index	Weight	Combined weight	Point value
Social reputation (0.2172)	22	Patient satisfaction (1)	22	Annual patient satisfaction	0.5218	0.1133	11
				Secondary visit rate	0.4782	0.1039	11
Medical service capacity (0.3424)	34	Human resources (0.1124)	4	Proportion of personnel with senior titles	0.0606	0.0207	2
				Percentage of personnel with post-graduate education or above	0.0518	0.0177	2
		Medical quality (0.4381)	15	Prescription pass rate	0.0648	0.0222	2
				Effective rate of treatment	0.0662	0.0227	3
				Success rate of rescuing critically ill patients	0.0648	0.0222	2
				Accuracy of dispensing drugs	0.0619	0.0212	2
				Diagnosis coincidence rate	0.0634	0.0217	2
				Large equipment positive detection rate	0.0522	0.0179	2
				Incidence of medical errors	0.0648	0.0222	2
		Medical safety (0.3258)	11	Annual number of medical malpractices	0.0662	0.0227	2
				Incidence of medical disputes	0.0648	0.0222	2
				Infection rate of aseptic surgical incision	0.0662	0.0227	2
				Annual adverse event reporting rate	0.0621	0.0213	2
				Incidence of nosocomial infection	0.0665	0.0228	3
		Medical service efficiency (0.1237)	4	Bed utilization	0.0662	0.0227	2
				Average hospitalization days	0.0575	0.0197	2
Financial operations and management capability (0.2019)	20	Income and expenditure structure (0.7296)	15	Proportion of drug income	0.2507	0.0506	5
				Percentage of inspection and test income	0.2348	0.0474	5
				Percentage of management fee	0.2441	0.0493	5
		Debt paying ability (0.2704)	5	Hospital asset-liability ratio	0.2704	0.0546	5
Development potential (0.2362)	24	Personnel training (0.6657)	16	Passing rate of “three-basic and three-strict” examinations for medical personnel	0.3692	0.0872	9
				Proportion of staff going on further training	0.2965	0.0700	7
		Development and innovation (0.3343)	8	Number of new technologies or special therapy items	0.3343	0.0790	8
Total	100		100				100

Table 3: Evaluation criteria for comprehensive evaluation index system of private hospitals.

Third-level index	Evaluation criteria	National standard
Annual patient satisfaction	α≥85%, 11points; 80%≤α<85%, 8points; 75%≤α<80%, 5points; 70%≤α<75%, 2points; α<70%, 0points	≥85%
Secondary visit rate	α≥80%, 11points; 75%≤α<80%, 8points; 70%≤α<75%, 5points; 65%≤α<70%, 2points; α<65%, 0points	/
Proportion of personnel with senior titles	α≥15%, 2points; 5%≤α<15%, 1points; α<5%, 0points	/
Percentage of personnel with post-graduate education or above	α≥15%, 2points; 5%≤α<15%, 1points; α<5%, 0points	/
Prescription pass rate	α≥95%, 2points; 90%≤α<95%, 1points; α<90%, 0points	≥95%
Effective rate of treatment	α≥90%, 3points; 85%≤α<90%, 2points; 80%≤α<85%, 1points; α<80%, 0points	≥90%
Success rate of rescuing critically ill patients	α≥80%, 2points; 75%≤α<80%, 1points; α<75%, 0points	≥80%
Accuracy of dispensing drugs	α≥95%, 2points; 90%≤α<95%, 1points; α<90%, 0points	/
Diagnosis coincidence rate	α≥60%, 2points; 55%≤α<60%, 1points; α<55%, 0points	≥60%
Large equipment positive detection rate	α≥50%, 2points; 45%≤α<50%, 1points; α<45%, 0points	≥50%
Incidence of medical errors	α≤0.5%, 2points; 0.5%<α≤1.5%, 1points; α>1.5%, 0points	/
Annual number of medical malpractices	α=0, 2points; 0<α≤5, 1points; α>5, 0points	0
Incidence of medical disputes	α≤0.05%, 2points; 0.05%<α≤0.15%, 1points; α>0.15%, 0points	≤0.05%
Infection rate of aseptic surgical incision	α≤0.5%, 2points; 0.5%<α≤2%, 1points; α>2%, 0points	≤0.5%
Annual adverse event reporting rate	α=100%, 2points; 90%≤α<100%, 1points; α<90%, 0points	100%
Incidence of nosocomial infection	α≤8%, 3points; 8%<α≤9%, 2points; 9%<α≤10%, 1points; α>10%, 0points	≤8%
Bed utilization	α≥80%, 2points; 75%≤α<80%, 1points; α<75%, 0points	≥80%
Average hospitalization days	α≤10days, 2points; 10days<α≤15days, 1points; α>15days, 0points	≤10days
Proportion of drug income	α≤45%, 5points; 45%<α≤50%, 3points; α>50%, 0points	≤45%
Percentage of inspection and test income	α≤19%, 5points; 19%<α≤23%, 3points; α>23%, 0points	/
Percentage of management fee	α≤10%, 5points; 10%<α≤30%, 3points; α>30%, 0points	/
Hospital asset-liability ratio	α≤55%, 5points; 55%<α≤65%, 3points; α>65%, 0points	/
Passing rate of “three-basic and three-strict” examinations for medical personnel	α=100%, 9points; 95%≤α<100%, 7points; 90%≤α<95%, 5points; 85%≤α<90%, 3points; α<85%, 0points	100%
Proportion of staff going on further training	α≥15%, 7points; 10%≤α<15%, 5points; 5%≤α<10%, 3points; α<5%, 0points	/
Number of new technologies or special therapy items	α≥15, 8points; 10≤α<15, 5points; 5≤α<10, 2points; α<5, 0points	/

4 CONCLUSIONS

The results of this study show that among the first-level indexes, the top three scores are: medical service capacity (34), development potential (24), social reputation (22). Among the second-level indexes, the top three scores are patient satisfaction (22), personnel training (16), medical quality (15), and income and expenditure structure (15). Among the third-level indexes, in terms of social reputation, the highest combined weight is annual patient satisfaction (0.1133). In terms of medical service capability, the highest combined weight is the incidence of nosocomial infection (0.0228). In terms of financial operations and management capability, the highest combined weight is the hospital asset-liability ratio (0.0546). In terms of development potential, the highest combined weight is the passing rate of “three-basic and three-strict” examinations for medical personnel (0.0872).

4.1 Enhance Patient Satisfaction

Private hospitals should strengthen infrastructure construction and improve hospital environment, facilities and sanitation. Standardize the service attitude of medical personnel, and severely punish phenomena such as indiscriminate charges. Optimize the medical treatment process, improve the appointment diagnosis and treatment services, and widely carry out convenient services. Continuously improve the quality of medical care, improve medical technology, meet the needs of the people for medical services, and build a harmonious doctor-patient relationship, thereby enhancing patient satisfaction.

4.2 Implement Infection Management

Private hospitals should strengthen nosocomial infection management. In view of the current situation of epidemic prevention and control, private hospitals should implement the prevention of people and objects, the prevention of internal and external, and the prevention of doctors and patients. Integrate the concept of "three defenses" into diagnosis and treatment activities to reduce the risk of infection in private hospitals (Wang 2021). Adhere to strict management to ensure medical safety, formulate and improve a series of medical rules and regulations.

4.3 Optimize Asset Management

Private hospitals should optimize the hospital's asset management, strengthen the analysis and allocation of assets, and especially improve the management of fixed assets. Formulate regulations on the management of fixed assets and strictly implement the asset budget (Li 2019). The scale and increase or decrease of liabilities should be adapted to the hospital's demand for funds and solvency. A financial risk management and early warning mechanism should be established to dynamically monitor hospital assets and debt data to avoid potential risks (Zhou 2020).

4.4 Strengthen Talent Team Building

Private hospitals should reasonably excavate, develop and cultivate reserve talents. Attach great importance to the introduction and training of talents, attract talents through favorable treatment and perfect promotion system. Improve incentive measures, mobilize the enthusiasm of medical personnel to participate in scientific research work, and stimulate innovation vitality. Organize regular training and assessment. Strengthen the training of "three-basic and three-strict" for medical personnel, improve the level and quality of medical personnel. Thereby improving the quantity, efficiency and quality of medical services.

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