Research on The Budget Performance Evaluation System of Public Hospitals Based on The Balanced Scorecard: A Dual-Objective Approach to Operational Efficiency and Public Welfare

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Abstract: In recent years, with the advancement of China's national healthcare system reform, public medical institutions have been transforming from traditional development models to high-quality development models. During this transition, on the one hand, the state has accelerated the reform of DRG/DIP (Diagnosis Related Groups/Big Data Diagnosis-Intervention Packet) medical insurance payment methods, witnessed changes in patients' medical service demands, and faced continuous increases in operational costs. On the other hand, public hospitals need to strike a balance between operational efficiency and public welfare to ensure sustainable development. Public welfare is an unavoidable issue for public hospitals. Starting from the particularity of public hospitals and the current situation, this paper deeply studies the construction of a budget performance evaluation system for public hospitals that integrates the dual objectives of public welfare and operational efficiency. It explores the establishment of performance indicators combining qualitative and quantitative, static and dynamic, short-term and long-term factors, so as to clarify the implementation path of operational management in public hospitals under budget performance evaluation. By designing dynamic monitoring and using data from HIS (Hospital Information System), HRP (Hospital Resource Planning), and government assessment as the basic sources of the system, this paper proposes a compensation mechanism for the shortcomings in public welfare of public hospitals to address the interest conflicts between the dual objectives and promote the improvement of refined management in public hospitals.

Keywords: Hospital Operation Management; Public Welfare; Balanced Scorecard; Budget Performance Evaluation

1. Introduction

In the current social context, public hospitals face dual challenges of operational efficiency and public welfare, mainly due to the deepening implementation of medical reform policies and the uneven distribution of medical resources. On one hand, with the growth of medical service demand and the intensification of population aging, improving service capabilities and operational efficiency

is essential to meet the increasing needs of patients. Meanwhile, the revenue and expenditure scales of public medical institutions have continuously expanded, covering aspects such as medical treatment, teaching, research, prevention, budget compilation, and asset cost management. The allocation of economic resources, human resources, financial resources, and material and technical resources has become increasingly complex, putting greater pressure on operational efficiency.

On the other hand, public hospitals bear the social responsibility of ensuring public health security and providing basic medical services. Besides pursuing operational benefits, they must also focus on the social benefits of medical services. However, excessive emphasis on public welfare may affect the hospital's economic sustainability.

The comprehensive implementation of budget performance management revolves around the hospital's responsibilities and industry development plans, focusing on the management of budget funds. By comprehensively considering assets and business activities, it comprehensively measures the implementation effects of overall and core businesses from aspects such as operating costs, management efficiency, performance effectiveness, social benefits, sustainable development capabilities, and service object satisfaction. [1]

2. Current Situation of Performance Evaluation System in Public Hospitals

2.1 Insufficient Performance Awareness and Lack of Overall Participation

In the field of health, there are still many confusions in understanding and practical operation of budget performance management, including issues such as overlapping work among departments, unclear management responsibilities of units and localities, and a weak bottom-up performance management system. The concept of budget performance management has not been deeply rooted in public hospitals. There is insufficient understanding of the importance and necessity of budget performance, a lack of performance orientation in budgets, and low overall participation. [2] The breadth and depth of budget performance evaluation systems vary significantly across different regions, influenced by factors such as geographical location, medical resources, and personnel allocation.

2.2 Incomplete Evaluation System and Unscientific Indicators

Budget performance evaluation serves as the guiding principle for hospital budget management and a means of assessment. By establishing an evaluation system, it is possible to score various aspects of budget work, thereby evaluating the efficiency and effectiveness of work implementation. A complete evaluation system should include assessment indicators and assessment weight coefficients, and a budget assessment system that aligns with the hospital's management needs should be reasonably constructed based on the hospital's management objectives and existing management status. In some hospitals, the common indicators in the budget evaluation index system are not well-established. Different medical institutions have variations in values, guiding ideologies, business concepts, management styles, and behavioral patterns, which also affect budget fund management and lead to an imperfect mutual recognition and interoperability mechanism for budget performance indicators. [3]

2.3 Insufficient Application of Performance Evaluation Results, and Ineffective Combination of Incentives and Constraints

Currently, some public hospitals do not attach sufficient importance to the effective application

of performance evaluation results. The results of budget performance evaluation are not utilized in areas such as budget adjustment, optimization, allocation, personnel incentives, and accountability supervision, resulting in poor effectiveness of comprehensive budget performance management. Moreover, there is insufficient linkage between performance evaluation results and the next year's budget allocation. Public hospitals should further expand the scope of application of performance evaluation results to fully leverage the positive role of comprehensive budget performance management.

2.4 Budget Performance Evaluation in Some Hospitals Remains Superficial

Performance evaluation results must be regularly submitted to the competent authorities. After receiving these results, the competent authorities use methods such as deviation value calculation to verify the performance evaluation results of public hospitals. Currently, some public hospitals merely submit performance evaluation results to the competent authorities without in-depth analysis or practical application.

3. Construction of the Theoretical Framework for the Performance Evaluation System

3.1 Theory of the Balanced Scorecard

3.1.1 Balanced Scorecard of Public Hospitals Based on Operational Efficiency

In the management practice of public hospitals, operational efficiency is a crucial indicator for ensuring the quality of medical services and achieving sustainable development. The traditional Balanced Scorecard (BSC) framework of public hospitals, grounded in operational efficiency, encompasses four dimensions: finance, patient services, internal processes, and learning and growth. It primarily focuses on how to allocate medical resources more effectively to enhance the cost-effectiveness of medical services.

In the financial dimension, indicators such as cost control rate and return on assets are used to monitor the hospital's economic situation and resource allocation. The patient services dimension focuses on indicators like outpatient volume and inpatient satisfaction, which reflect the hospital's service quality and public satisfaction. The internal processes dimension emphasizes the unification of time efficiency, process quality, and efficiency in medical services. The learning and growth dimension reflects the hospital's investment in future development through indicators such as scientific research activities and talent cultivation.

3.1.2 Balanced Scorecard of Public Hospitals Based on Public Welfare

The balanced scorecard (BSC) of public hospitals based on public welfare is used to evaluate and manage hospitals. When providing medical services, hospitals should actively assume social responsibilities to promote the improvement of public health services. This scorecard takes into account the impact of non-profit activities on financial status.

The social welfare dimension of public hospitals is used to assess the effectiveness of hospitals in rural revitalization, emergency medical treatment, public health, and other aspects. To calculate the proportion of investment in rural revitalization, the total resources invested by the hospital in rural revitalization should be divided by its total revenue. This proportion reflects the hospital's emphasis on rural revitalization and the efficiency and effectiveness of fund utilization. Emergency medical treatment capabilities can be evaluated based on the quantity and quality of the hospital's participation in emergency rescue missions. When quantifying, data such as the number of medical

staff dispatched by the hospital during the latest major emergency, the duration of medical assistance provided, and the rescue success rate can be recorded. The evaluation of public health services covers disease prevention and control, health education promotion, and other aspects. Setting quantitative indicators such as the vaccination rate for disease prevention and the penetration rate of health knowledge can reflect the hospital's contribution to promoting public health.

3.1.3 Design of the Dual-objective BSC Model

When designing the BSC model with the dual objectives of operational efficiency and public welfare, this paper proposes an innovative five-dimensional framework to adapt to the dual missions of public hospitals. These five dimensions are financial sustainability, patient services, internal processes, learning and growth, and social welfare. Among them, the social welfare dimension focuses on the hospital's social responsibilities, such as public welfare activities related to rural revitalization and emergency medical treatment, which can strengthen the hospital's public welfare image and social influence. This improved framework of the dual-objective BSC helps to promote the transformation of public hospitals towards sustainable development with greater emphasis on social benefits.

Public medical institutions shoulder the mission of providing basic medical services to the general public, aiming to meet patients' medical needs and achieve maximum social benefits. This is consistent with the direction of national medical reform and policy requirements.

3.2 Design of the Weight Range for Dual-objective Game

When determining the weight range, the importance of each indicator is first clarified. Subjective data on the importance of indicators in different dimensions are collected through expert consultations, questionnaires, and other methods. Then, the weights of each indicator are objectively calculated using a combined weighting method (such as the Analytic Hierarchy Process combined with the Entropy Weight Method). Additionally, the influence of public policies and the long-term development needs of the hospital should be considered. Therefore, the weight settings need to be updated dynamically on a regular basis to adapt to changes in the external environment. The core responsibilities of public hospitals are to ensure the quality of medical services and patient safety, as well as to possess innovative capabilities and sustainable development potential for the future. Ultimately, the weight range of the dual-objective game will establish a dynamically adjusted evaluation system.

4. Construction of the Budget Performance Evaluation System

4.1 Initial Selection of Evaluation Indicators (Operational and Public Welfare)

The budget performance assessment indicator system aims to improve the quality and efficiency of budget revenue and expenditure in public hospitals by embedding the concept of performance assessment into all links of planning, implementation, and supervision. The main construction method is to set hospital target management with performance as the core orientation and focus on performance goals. By presetting goals and conducting performance analysis, real-time monitoring of the progress during implementation, and finally summarizing the achievement of goals, these evaluation results will serve as important references for optimizing decision-making and budget management. The implementation process evolves from setting performance assessment goals for individual projects to comprehensive assessment covering overall performance and project

performance goals. Adhering to the principle of matching rights and responsibilities, tracking effectiveness, and effectively fulfilling the main responsibilities of budget performance management.

Currently, the main objects of budget performance assessment in most public hospitals are general public budget financial projects. Using the Balanced Scorecard (BSC) to construct a more comprehensive type of indicators and incorporating non-general public budget projects into the assessment system can achieve true full coverage of budget management. Combining process evaluation with result evaluation, covering the assessment of budget compilation, supervision process, mid-term adjustment, and budget execution. Using Key Performance Indicators (KPI) to measure key positions, key departments, and relevant staff, paying special attention to important economic activities, adopting target-oriented quantitative management indicators, decomposing the hospital's strategic goals into actionable work goals, and constructing corresponding evaluation indicators.

When designing the hospital budget performance evaluation system, attention should be paid to integrating the short-term goals of departments with the long-term goals of the hospital to avoid the phenomenon of only pursuing departmental interests and short-term goals while ignoring the overall interests and long-term goals of the hospital. [4] The construction of the indicator library can combine long-term and short-term indicators according to the hospital's plan, including cost-related indicators, operating status indicators, and economic benefit indicators at the financial management level; medical service quality indicators, scientific research and teaching indicators, etc. at the business management level. Public welfare can be reflected in social benefit indicators and service object satisfaction indicators. Referring to the requirements of performance assessment for public hospitals, qualitative and quantitative indicators are set. Qualitative indicators are used to evaluate the process, while quantitative indicators are used to measure the results, and the weights of indicators are reasonably allocated. The combination of dynamic and static indicators is studied. Since hospital development is significantly dynamic, dynamic comparisons are made with reference to business growth volume and growth rate.

At the same time, referring to the requirements of the "national assessment" for performance assessment of public hospitals, the construction of common indicators for each project budget of public hospitals is improved from the aspects of economics, efficiency, effectiveness, and fairness of budget use, standardization construction is promoted, and a mutual recognition and interoperability mechanism is established. On the other hand, it is necessary to maintain connections and coordination with other assessment work. These indicators are highly important and universal, facilitating mutual data indexing to improve evaluation efficiency and avoiding the negative impacts of excessive assessment on hospitals.

4.2 Establishment of the Performance Evaluation Indicator Library

4.2.1 Design of Key Indicators

The research on the budget performance evaluation system is based on the dual-objective BSC model. Key performance indicators further refine key factors. Public hospitals need to comprehensively consider ensuring that key performance indicators comply with the SMART principle, namely Specific, Measurable, Attainable, Relevant, and Time-bound. [5] Specifically, it covers the following aspects:

Operational Efficiency Indicators: Mainly focus on the effectiveness of the hospital's daily operations, measuring the overall operational capabilities of the hospital by analyzing the efficiency

of various resource allocations (including bed utilization rate, personnel work efficiency, equipment utilization rate, drug cost ratio, etc.).

Medical Service Capacity Indicators: The service scale and quality of the hospital are mainly reflected in aspects such as the number of outpatient and emergency consultations, average length of stay, and the ratio of discharged patients.

Financial Status Indicators: The focus is on the efficiency of hospital fund use, such as debt-to-asset ratio, surplus of financial projects, medical surplus, growth rate of medical income, cost control ratio, to ensure that the hospital can operate economically and efficiently while maintaining service quality.

Patient Satisfaction Indicators: Focus on the quality and effectiveness of hospital services, such as waiting time for medical treatment, attitude of medical services, and satisfaction feedback, which reflect the hospital's efforts to enhance public well-being.

Single Disease Management Indicators: The service efficiency and cost-effectiveness of the hospital for specific diseases can be evaluated through indicators such as the average treatment cost and treatment cycle of single diseases.

Major Disease Treatment Capacity Indicators: Reflect the treatment capacity and level for complex and critical diseases from aspects such as the setting of relevant departments and the treatment success rate.

Human Resources Indicators: The utilization of human resources in the hospital can be reflected by the number, professional distribution, and changes of doctors, nurses, and other employees.

Scientific Research and Teaching Indicators: The proportion of scientific research expenditure in business expenditure, the status of key discipline construction, etc. Including the pass rate of qualification examinations for health training students, talent cultivation implementation plans, achievement of expected goals in improving hospital service capabilities, the establishment of scientific research projects, awards of scientific research projects, transformation of scientific research project results, evaluation of comprehensive scientific research capabilities, publication of high-quality papers. [6]

Public Health Prevention and Health Care Indicators: Reflect indicators related to public health, disease prevention, health education, prevention, and health care.

4.2.2 Overall Expenditure Performance Indicators

Based on the design premise, the construction of first-level indicators for the overall expenditure performance goals of this indicator system mainly focuses on "output categories, benefit categories, and satisfaction categories", reflecting both economic indicators related to financial operations and public welfare indicators such as sustainable impact and social benefits. It can be further subdivided into 10-20 second-level indicators and 30-60 third-level detailed indicators. The entire evaluation system maximally reflects the true demands of hospitals during field research and achieves a good balance between the fulfillment of hospital responsibilities and operational development. The main indicator settings are as follows:

First-level Main Indicators: Output category, benefit category, and satisfaction category indicators.

Second-level Module Indicators: Covering indicators related to quantity, quality, timeliness, cost, economic benefits, social benefits, ecological benefits, sustainable development impact, satisfaction of target service objects, and other satisfaction.

Third-level Detailed Indicators: Budget completion rate, soundness of the budget management system, medical quality (mainly including the ratio of outpatient to discharged patients, the ratio of surgical patients among discharged patients, complication rate of surgical patients, classification of electronic medical record application function levels, etc.), operational efficiency (mainly including the proportion of medical service income in medical income, the proportion of high-value medical consumable income in material income, the proportion of personnel expenses in business expenditures, energy consumption expenditure per 10,000 yuan of income, growth rate of average outpatient expenses, growth rate of average inpatient expenses), financial status (proportion of monetary funds in total assets, debt-to-asset ratio, current ratio, inventory turnover), scientific research capabilities (mainly including three modules: personnel construction, discipline construction, and profitability), social benefits (including social responsibility, rural revitalization, and satisfaction).

The indicator system of public hospitals should consider different hospital types and levels separately, and the system should be universally applicable. This is mainly reflected in the ability to make personalized replacements or assign weights based on the actual situation of different regions, referring to factors such as target value deviation, average value deviation, and completion ranking [7].

With engineering projects as the orientation, comprehensive course design topics are designed, such as "Design of Flow Solid Coupling Drag Reduction Structure for Unmanned Underwater Vehicle", requiring students to establish three-dimensional geometric models, simulate pressure distribution and drag coefficients under different grid angles, and optimize structural parameters using the orthogonal test method.

4.2.3 Basic Data Collection (HIS System/HRP System)

In the research on the budget performance evaluation system of public hospitals, operational data is an important basis for evaluating hospital operational efficiency. Most of this data is obtained from the Hospital Information System (HIS), Hospital Resource Planning (HRP) system, quality management system, personnel system, etc. When constructing the evaluation system, the data needs to be real and accurate. Efficient integration of the HIS system and HRP system should be achieved, and data management and quality control measures should be formulated. Public welfare data generally comes from relevant government assessments and annual key work tasks, evaluating the hospital's policy implementation when assuming social responsibilities, such as community service activities, rural revitalization, social donations, quality of medical security services, and response capabilities to major public health incidents.

5. Application of the Performance Evaluation System

5.1 Results of Dynamic Monitoring

The research shows that in certain quarters, operational costs may increase due to business peaks or issues with cost control measures. By comparing satisfaction indicators on a quarterly basis, it is found that high satisfaction is mostly directly related to the high-quality medical services provided by the hospital. During the evaluation of public welfare, the frequency of activities such as poverty alleviation assistance and emergency medical treatment varies each quarter, which places different demands on the hospital's resource allocation. Moreover, during public health incidents, the hospital's performance in fulfilling social responsibilities becomes more prominent, consuming a large amount of resources. The results of dynamic monitoring can point out specific directions for

hospitals to adjust their operation management strategies, optimize resource allocation, and improve service quality.

5.2 Abnormality Early Warning Mechanism for Key Indicators

In empirical analysis, thresholds for Key Performance Indicators (KPIs) are set through the abnormality early warning mechanism. Alarms are triggered when indicators exceed or fall below the normal range. For example, when the patient satisfaction of a hospital significantly decreases for two consecutive quarters, urgent measures such as improving service quality and optimizing medical service processes should be taken. The abnormality early warning mechanism enables users to intuitively see the specific actions and impact effects of the hospital's development, helping the management quickly understand which dimensions perform well and which need improvement. It monitors and controls the achievement of budget performance goals, identifies deviations and weak links in the budget implementation process, corrects deviations and makes rectifications in a timely manner, fills the loopholes in the operation monitoring and management of budget performance, and thus ensures that the budget is strictly implemented according to the established plan [8].

5.3 Fund Allocation Model Based on Evaluation Results

The fund allocation model based on evaluation results is crucial for achieving optimal resource allocation. This model takes into account various factors, including the results of budget performance evaluation, the actual needs of hospitals, and their financial status. The fund allocation model of financial departments can adopt methods such as the weighted average method and combine with the opinions of expert reviews to allocate financial budgets. For hospitals with high performance and outstanding public service performance, financial departments can provide financial incentives to support them in improving the quality and coverage of public services while maintaining good operational efficiency. This application mechanism based on performance evaluation results can optimize the allocation of public resources, ensure the overall development level of public hospitals, maximize the social benefits of public medical services, and truly achieve the goal of balancing operational efficiency and public services.

5.4 Development of the Budget Evaluation Decision Support System

The budget evaluation support system for public hospitals provides a set of tools for the management to optimize resource allocation and enhance the level of budget performance management. This system can integrate the indicator library and dynamic performance monitoring, conduct in-depth data analysis and processing, monitor the budget implementation of hospitals in real-time, and promptly identify existing problems and risks. The core functions of the system are as follows:

Data Visualization Display: The trends of the hospital's budget implementation and the completion of key performance indicators.

Dynamic Early Warning Mechanism: Real-time monitoring of key budget indicators, automatically triggering early warnings in case of deviations or abnormalities.

Result Tracking and Application: By relying on historical data and prediction models, it can simulate the operation effects under different strategies to assist the management in making more reasonable budget adjustment decisions. At the same time, it records and analyzes the actual effects after budget adjustments.

6. Policy Recommendations

6.1 Facilitating the Transformation of Hospital Refined Management

The profit-oriented traditional BSC has limitations. In the design of the budget performance evaluation indicator system of many public hospitals, there are various problems and drawbacks, such as emphasizing economic benefits over social benefits or vice versa [9]. The performance evaluation system proposed in this study for the first time introduces the "public welfare dimension," adding a new perspective to the traditional BSC framework. After the introduction of public welfare indicators, hospitals no longer focus solely on economic benefits but begin to pay attention to non-financial indicators such as the quality of medical services, social responsibilities, and care for vulnerable groups. This can not only optimize resource allocation and improve the overall operational efficiency of hospitals but also enhance the social responsibility of hospitals, thereby better meeting the public's health needs.

Multi-dimensional indicators such as patient satisfaction, medical quality, scientific research level, and social responsibility can comprehensively monitor the operation and management status of hospitals. Focusing on monitoring and evaluating the efficiency of internal processes, such as DRG (Diagnosis Related Groups) efficiency, can help hospitals find a better balance between the quality of medical services and cost control. The evaluation system proposed in this study not only enriches the theoretical system of budget performance evaluation for public hospitals but also provides practical methodological support for health authorities in formulating and implementing relevant policies. Health authorities can conduct horizontal comparisons among hospitals in different regions and of different types to identify the advantages and disadvantages of medical services and promote the transformation of public hospitals towards high-quality development.

6.2 Compensation Mechanism for Shortcomings in Public Welfare

In the budget performance evaluation system of public hospitals, the issue of shortcomings in public welfare urgently needs to be addressed. Resources are often overly allocated to aspects of economic benefits, which affects the overall quality and efficiency of medical services. Therefore, the design of a corresponding financial compensation mechanism is extremely important. The compensation mechanism can be constructed from the following aspects:

First, increase financial support: Public health, primary medical care, and other service projects have strong public welfare but low economic benefits, and hospitals have insufficient investment in these areas. Therefore, the government can make up for this through financial allocations.

Second, establish special funds: Set up special funds specifically for public welfare services such as medical poverty alleviation, community health services, and major public health emergencies.

Third, incentive and reward-punishment mechanism: Hospitals that perform outstandingly in public welfare services should be commended and rewarded, while hospitals that fail to meet the expected requirements of the indicators should be punished, such as restricting resource allocation.

Fourth, link medical insurance payments with public welfare assessments: Medical insurance payment policies can be differentiated according to the public welfare performance of hospitals. Hospitals with excellent public welfare services can receive payment incentives, and the pressure of payment policies on hospitals with low levels of public welfare services will prompt them to make improvements.

Fifth, cross-departmental cooperation: Departments such as health, civil affairs, and finance

should strengthen cooperation and jointly work to establish a long-term mechanism to promote the development of public welfare services in hospitals. Moreover, attention should be paid to policy promotion and public participation to enhance the public's awareness of the social responsibilities of medical institutions.

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