

Practice Research on Fine Control of Disease Cost in Public Hospitals under the Reform of DRG Payment Mode

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Abstract: This article explores the effective path of fine control of disease costs in public hospitals under the background of DRG (Diagnosis Related Group) payment reform, providing a theoretical framework and practical reference for hospitals to transform from scale expansion to connotation development. Integrating the perspectives of health economics, management science and clinical medicine, a theoretical framework covering the construction of disease cost accounting system, the development of cost control tools and the innovation of performance evaluation mechanism was constructed. Taking the People's Hospital of A City as a case, the activity-based costing method was adopted to reconstruct the cost flow, the intelligent system of clinical pathway-cost linkage and the dynamic monitoring platform were deployed, and the "3+1" multi-dimensional performance evaluation mechanism was implemented to carry out a two-year empirical study. After the implementation, the average cost of DRG group in A Hospital decreased from 5743 yuan to 4987 yuan, with a decrease of 13.2%, the surplus rate of medical insurance settlement increased from 1.2% to 6.8%, the proportion of deficit diseases decreased from 37.5% to 14.2%, and the implementation rate of clinical pathway jumped from 51% to 82%. Taking GB25 group as an example, the proportion of high-value consumables decreased by 9.3 percentage points, the complication rate decreased from 4.1% to 3.3% ($P < 0.05$), and the patient satisfaction increased to 92.5 points. Data granularity determines control accuracy, clinical participation determines landing depth, and policy adaptability determines sustainability. Through the closed-loop management of "calculation-feedback-iteration", the cost control and medical quality can be improved.

1. Introduction

As the core reform direction, DRG (Diagnosis Related Groups) payment changes the management of medical insurance fund from post-audit to pre-budget through the mechanism design of total prepayment and balance retention, which forces public hospitals to transform from scale expansion to connotation development [1]. The contradiction between the risk of medical insurance fund bottoming out under DRG payment and the increasing pressure of hospital operation is increasingly prominent. On the one hand, the medical insurance department strengthens the cost

control through DRG weight coefficient and rate adjustment [2]; On the other hand, hospitals are faced with the dilemma of "increasing income without increasing profits" or even losing money because of the extensive cost accounting of diseases, high variation rate of clinical pathways and lack of resource consumption standards [3]. By integrating the perspectives of health economics, management science and clinical medicine, this paper constructs a theoretical framework for fine control of disease cost under DRG payment, and provides a new analytical tool for hospital management discipline.

2. Practical path of fine control of disease cost

2.1. Construction of disease cost accounting system

Accurate cost accounting is the logical starting point of fine control of disease cost. Aiming at the pain point of extensive traditional accounting and lack of resource consumption standards, the first step is to build a disease cost accounting system that adapts to DRG payment rules. The system breaks through the limitation of traditional department cost accounting, takes DRG diseases as accounting unit, integrates clinical pathway, resource consumption and cost drivers, and establishes a hierarchical collection mechanism from project cost to disease cost [4]. In this paper, the whole process of clinical diagnosis and treatment is sorted out, and the resource consumption standards of each link are clarified. Combined with scientific methods such as activity-based costing and cost equivalent method, the cost composition of manpower, material resources and consumables of different DRG diseases is accurately measured, and a standardized and traceable disease cost database is formed, which provides reliable data support for subsequent management and control decisions, and makes cost management and control move from fuzzy estimation to accurate measurement.

2.2. Development of cost control tools

On the basis of accurate accounting, develop cost control tools that are suitable for clinical practice. Aiming at the problems of high variation rate of clinical pathway and lack of effective grasp of cost control, an integrated control tool matrix was built based on information technology. On the one hand, the intelligent management and control system linking clinical pathway and cost is developed, and the cost management and control node is embedded in the clinical diagnosis and treatment process, so as to realize real-time monitoring of diagnosis and treatment behavior and cost consumption, timely warn and intervene the path variation exceeding the standard cost, and standardize resource consumption from the source [5]; On the other hand, building a dynamic monitoring platform for DRG disease cost can track in real-time the alignment between disease costs and medical insurance payment standards, identify risk points of cost overruns, provide visual cost control guidance for departments and clinical teams, promote the shift of management from post-hoc remediation to mid-process intervention and pre-event warning, and achieve deep integration of cost control with clinical treatment.

2.3. Innovation of performance evaluation mechanism

Performance evaluation is the baton to drive cost control, and innovating the performance evaluation mechanism to meet the needs of refined control is the key to ensure the long-term operation of the practice path [6]. Breaking away from the traditional performance orientation centered on revenue, we are building a multidimensional performance evaluation system centered on disease cost control, resource utilization efficiency, and medical quality. The core indicators of

disease cost compliance rate, medical insurance balance rate and clinical pathway implementation rate are included in the performance evaluation category, and an incentive mechanism directly linked to department performance and medical staff salary is established [7]. This paper establishes a dynamic evaluation mechanism to optimize the weight of evaluation indicators according to the adjustment of DRG payment policy and hospital management objectives. This will strengthen positive incentives for the effectiveness of cost control, and guide departments to actively optimize medical treatment behaviors and reduce resource consumption through differentiated evaluations. It will fully mobilize the enthusiasm of all staff to participate in cost control, forming a closed-loop management with clear goals, incentives for implementation, and evaluations of results, providing continuous momentum for detailed cost control of disease categories.

3. Case empirical study

3.1. Research objects and methods

3.1.1. General situation of case hospital

People's Hospital of A City is selected as the research object, which is a three-level first-class general hospital with 1,500 beds and about 80,000 discharged patients every year. In 2022, the hospital was included in the pilot project of DRG payment in A city, covering 85% of inpatients with medical insurance. At the beginning of the pilot (2022Q1), the data showed that the total weight of DRG increased by 12% year-on-year, but the surplus rate of medical insurance settlement was only 1.2%, among which 15 core DRG groups (accounting for 40% of the discharge) suffered systematic losses, and the average cost of a single disease was 18%-32% higher than the regional benchmark value.

3.1.2. Scheme design

Based on the above-mentioned theoretical framework of disease cost fine control, a "three-step" empirical scheme is designed. Among them, in the basic stage (2022Q2-Q3), the DRG disease cost accounting system was established, and historical data cleaning and cost collection were completed; In the tool stage (2022Q4-2023Q1), the clinical pathway-cost linkage intelligent system and dynamic monitoring platform were deployed; In the deepening stage (2023Q2-2024Q1), the multi-dimensional performance evaluation mechanism will be implemented, and all staff training and continuous improvement will be carried out.

3.2. Implementation process and key measures

3.2.1. Construction of disease cost accounting system

Table 1 GB25 standard cost structure (unit: yuan)

Cost item	Standard value	Actual average (before the pilot)	Deviation rate
Medicines and chemical reagents	680	892	+31.2%
High value consumables	1850	2315	+25.1%
Inspection inspection	420	512	+22.0%
Manpower and depreciation	950	1028	+8.2%
Total	3900	4747	+21.7%

Taking "GB25 laparoscopic cholecystectomy" and "FD21 interventional therapy for acute myocardial infarction" in DRG group as accounting units, the cost flow was reconstructed by activity-based costing (ABC). Direct cost drugs, high-value consumables and special manpower for operation are collected according to the actual consumption of 100%; Indirect cost nursing man-hours, equipment depreciation and administrative allocation are converted by "cost equivalent coefficient", with general ward nursing =1 equivalent and ICU nursing =3 equivalent.

According to the National Clinical Pathway (2022 Edition), the resource consumption standard is established, as shown in Table 1.

3.2.2. Application of cost control tools

Decompose the GB25 standard pathway into 11 key nodes, including preoperative use of antibiotics, selection of hemostatic materials during surgery, setting cost thresholds with a standard value of $\pm 15\%$. In 2023, 427 warnings were triggered, of which 62% were overspent on consumables, mainly in general surgery; Through the mechanism of "pop-up reminder+department director's approval", the mutation rate decreased from 38% to 16%.

Construct DRG cost-payment profit and loss matrix (as shown in Figure 1), and track the cost index (actual cost/payment standard) of each disease in real time. In the red area (index >1.2), the cost index of FD21 group (acute myocardial infarction intervention) reached 1.28, mainly because the stent selection exceeded the standard and the domestic substitution rate was less than 30%; In the green area (index <0.9), the cost index of GE15 group (community-acquired pneumonia) was stabilized at 0.86 by optimizing antibiotic ladder use.

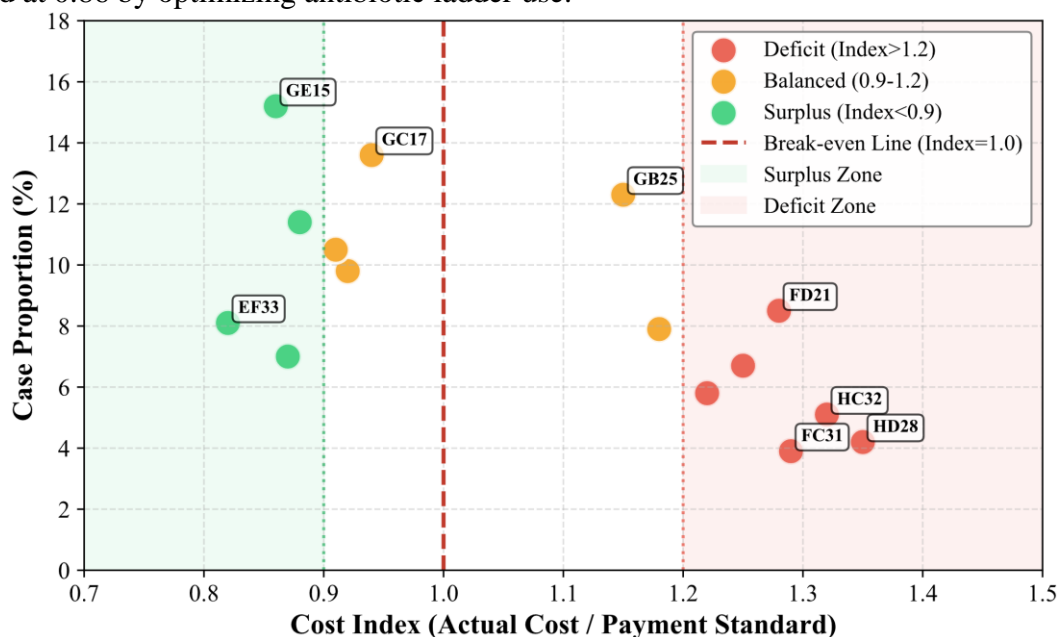


Figure 1 DRG cost-payment profit and loss matrix

3.2.3. Landing of performance evaluation mechanism

Set the "3+1" core dimension, as shown in Table 2 below.

Linking the performance score to the bonus pool of the department, the bonus will increase by 3% for every 1 point of promotion, and the attending physician's "cost responsibility field" will be bound at the personal level. In 2023, the total performance score of general surgery increased by 27%, among which the single score of "disease cost reaching the standard rate" increased by 41%.

Table 2 Weight of DRG performance evaluation index in general surgery

Dimension	Core indicators	Weight	Assessment description
Cost control	Disease cost compliance rate	35%	Get full marks of $\geq 90\%$
Resource efficiency	Average length of stay decreased	20%	Get full marks if the benchmark drops by $\geq 10\%$
Medical quality	Complication rate/low risk mortality rate	30%	The average value of \leq area is full marks
Medical insurance coordination	Contribution of DRG group balance	15%	Score according to the balance amount

3.3. Empirical results and analysis

After the implementation of DRG payment and cost control measures, the overall operational efficiency of Hospital A has been significantly improved. Compared with before the pilot (the first quarter of 2022), by the fourth quarter of 2023, the average cost of DRG group has dropped from 5743 yuan to 4987 yuan, a decrease of 13.2%; The surplus rate of medical insurance settlement has greatly increased from 1.2% to 6.8%, an increase of 5.6 percentage points; The proportion of loss-making diseases dropped sharply from 37.5% to 14.2%, a decrease of 23.3 percentage points; The implementation rate of clinical pathway jumped from 51% to 82%, an increase of 31 percentage points; Expenditures on consumables corresponding to medical income of 100 yuan decreased from 29.7 yuan to 24.1 yuan, a decrease of 18.9%. See Table 3 for the key indicators after implementation.

Table 3 Comparison of DRG payment and cost control in a hospital

Index	Before the pilot program (Q1 2022)	After implementation (Q4 2023)	Variation range
Average cost of DRG group	5743 yuan	4987 yuan	↓13.2%
Surplus rate of medical insurance settlement	1.2%	6.8%	↑5.6pp
Proportion of loss-making diseases	37.5%	14.2%	↓23.3pp
Clinical pathway implementation rate	51%	82%	↑31pp
Expenditures on consumables for medical income of 100 yuan	29.7 yuan	24.1 yuan	↓18.9%

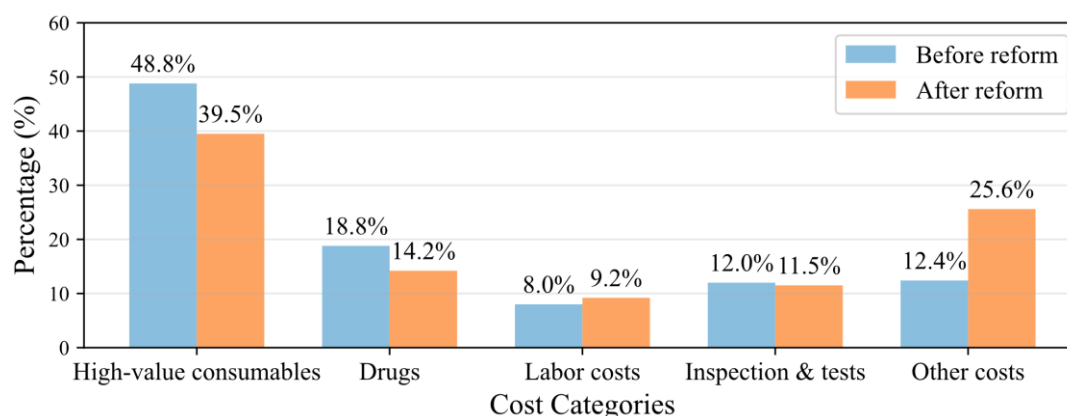


Figure 2 Cost composition change

Taking GB25 group (n=386 cases) as an example, the cost composition changes are shown in

Figure 2. The proportion of high-value consumables decreased from 48.8% to 39.5%, and the ultrasonic scalpel was popularized to replace some staplers, saving 820 yuan in a single case; The proportion of drugs decreased from 18.8% to 14.2%, and ERAS of accelerated rehabilitation surgery was implemented to reduce the use of analgesic pumps; The labor cost increased slightly by 1.2%, the post of case manager was increased, and the perioperative follow-up was strengthened.

There was no decline in medical quality during the control period, the complication rate decreased from 4.1% to 3.3% ($P < 0.05$), and the readmission rate was stable at 2.1%-2.4%. The score of patients' satisfaction increased from 88.7 to 92.5, with emphasis on cost transparency and no excessive examination.

The granularity of data determines the control accuracy, which needs to be refined to the subtypes in DRG group to avoid the average trap; Clinical participation determines the depth of landing, transforming cost control into clinically operable path rules rather than administrative instructions; Policy adaptability determines sustainability. With the annual adjustment of DRG weight, the standard cost is updated synchronously, and a closed loop of "calculation-feedback-iteration" is established.

4. Safeguard mechanism and policy suggestions

4.1. Internal guarantee mechanism

(1) Strengthen organizational leadership and cross-departmental cooperation

The hospital should set up a special leading group, led by the senior leaders of the hospital and composed of the heads of finance, medical care, information and clinical departments, which is responsible for the overall planning and decision-making of the fine control of disease cost under the reform of DRG payment method. The hospital establishes an inter-departmental cooperation mechanism and holds regular inter-departmental coordination meetings to solve specific problems encountered in the implementation process, so as to ensure the effective implementation of disease cost accounting, cost control tool application and performance evaluation mechanism.

(2) Improve data management and information system support

Hospital departments should establish data cleaning, checking and auditing mechanisms to ensure the accuracy, completeness and timeliness of disease cost data. Hospital departments should upgrade hospital information system (HIS) to realize seamless connection with DRG payment system, cost accounting system and performance evaluation system, and improve data processing efficiency and analysis ability. Hospital departments need to establish a data sharing platform to promote data sharing among all departments within the hospital and provide comprehensive data support for fine control of disease costs.

(3) Strengthen personnel training and capacity building

The hospital department should organize the medical staff of the whole hospital to participate in the training of DRG payment mode reform, disease cost accounting and application of cost control tools, so as to improve the cost awareness and control ability of all staff. A disease cost control team composed of experts in finance, medicine, information and other fields is established to be responsible for specific implementation and continuous improvement. Hospital departments should support medical staff to carry out academic research related to the reform of DRG payment methods, and enhance the academic influence and practical level of hospitals in this field.

(4) Establish dynamic adjustment and feedback mechanism

Regularly evaluate the implementation effect of disease cost fine control measures, and adjust the control strategy and performance evaluation index weight in time according to the evaluation results. Hospital departments should establish smooth feedback channels, encourage medical staff and managers to put forward improvement opinions and suggestions, and form a virtuous circle of

continuous improvement.

4.2. External policy suggestions

(1) Improve DRG payment policies and standards

It is suggested that the medical insurance department further refine the grouping of DRG, reasonably set the weight and rate of each disease group, and ensure the reasonable distribution of medical insurance funds and the reasonable income of hospitals. The medical insurance department establishes a dynamic adjustment mechanism of DRG payment standard, and timely adjusts the payment standard according to medical technology progress, price changes and other factors to maintain its scientificity and rationality.

(2) Strengthen communication and cooperation between medical insurance and hospitals

Medical insurance departments and hospitals should establish a regular communication mechanism to jointly analyze the problems and difficulties encountered in the implementation of DRG payment reform and seek solutions. The medical insurance department should open relevant data and information to the hospital, help the hospital better understand the DRG payment policy, master the use of medical insurance funds, and improve the pertinence and effectiveness of fine control of disease costs.

(3) Provide policy support and incentives

Give financial subsidies or preferential tax policies to hospitals that actively participate in the reform of DRG payment methods and have achieved remarkable results, so as to reduce the economic burden of hospitals. The hospitals and individuals who have made outstanding achievements in the DRG payment system reform will be commended and rewarded, stimulating the enthusiasm and creativity of the hospitals.

(4) Strengthen supervision and evaluation

The medical insurance department should establish and improve the supervision system for the implementation of DRG payment reform in hospitals to ensure that hospitals strictly follow the policy requirements. The medical insurance department should regularly evaluate and feedback the implementation effect of DRG payment reform in hospitals, help hospitals find problems and improve their work, and promote the continuous and in-depth development of DRG payment reform.

5. Conclusion

This study provides a dynamic control paradigm of "measurement-feedback-iteration" for DRG payment reform, which has important theoretical and practical significance for promoting the transformation of public hospitals from scale expansion to connotation development. It is suggested that the follow-up study should further refine the granularity of subtype control in DRG group, strengthen clinical participation, establish a normalized coordination mechanism between medical insurance departments and hospitals, and continuously improve the dynamic adjustment mechanism of standard costs to meet the new challenges brought by medical technology progress and price fluctuations.

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