

Research on Innovative Reform Strategies for Public Hospital Finance under the Context of Informatization

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Abstract: According to the strategic objective of developing public tertiary hospitals as leaders in building a strong society, this research investigates new reform approaches for the financial management of public hospitals under the background of informatization. It deals with important issues like the insufficiency of system functions, data isolation, complicated operations, lack of risk management techniques and inaccurate cost control. A novel idea of ‘intelligent financial management’ is put forward, which recommends the combination of advanced information technologies, including big data, artificial intelligence, deep learning, and blockchain, to accomplish complete automation, intelligent upgrading, and improved decision-making abilities. Considering the particular socio-economic and medical conditions of public hospitals, the research uses a multi-faceted and interdisciplinary method, integrating case studies, data mining, and predictive modelling. The main objectives are the reformation of financial procedures, innovative financial risk management and optimized cost control with resource allocation. Furthermore, it discusses the major obstacles such as data integration with privacy protection, enhancement of personnel competence and system compatibility during the continuous reform. Corresponding countermeasures are suggested, such as technology integration, establishment of risk assessment models, deployment of decision support tools, and formation of an ongoing improvement system. The results are intended to offer theoretical assistance and practical guidance for the modernization of public hospital financial management in both public hospitals and throughout the country, thus contributing to the advancement of high-quality and sustainable development of the public health system.

Keywords: Public hospital; Financial management; Informatization reform; Intelligent finance; Risk assessment; Cost control; Data integration; Artificial intelligence; Continuous improvement mechanism

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1. Introduction

According to the objective of establishing strong public tertiary hospitals, this research intends to investigate effective ways to carry out the informatization reform of medical financial management. It concentrates on solving the particular and challenging problems in public medical financial management in order to promote

the continuous progress and excellent development of public hospitals in the new era. The public health system is experiencing rapid changes, especially in the area of medical financial management. The key problem is to fully utilize modern information technology to improve the service efficiency and increase the transparency of finances. With the substantial increase in public medical requirements, there is an increasing demand for the quality and efficiency of medical services. Therefore, public medical institutions should adopt information technology tools like big data and artificial intelligence to not only optimize the financial procedures but also improve the quality and efficiency of the decision-making. At present, most public medical financial information systems do not have enough functions, suffer from serious data isolation and have complex operations. These issues directly affect the timeliness and accuracy of financial data, which affects the operating efficiency and financial situation of medical institutions. Additionally, the lack of financial risk management tools and improper cost control are also important problems that the public institutions need to solve urgently. Considering these circumstances, this project aims to introduce and apply advanced information technologies to develop and implement special innovative strategies for medical financial management, with the aim of enhancing the efficiency, accuracy and transparency of financial management in public medical institutions. By conducting thorough research and empirical analysis of the actual situations in public institutions, this project will put forward solutions suitable for local conditions, assist public hospitals in modernizing their financial management and provide theoretical and practical references for the informatization reform of medical financial management in both public institutions and the whole country. In summary, this project not only meets the requirement of high-quality philosophical and social scientific achievements in the new era but also actively fulfills the general demand of “real feelings and practical actions.” This is particularly shown in the detailed research and practical exploration of the informatization reform of medical financial management, trying to offer strong theoretical and intellectual support for the sustainable development of the public health system and inject new momentum into the economic and social development of public hospitals.

In order to investigate the global research trends in hospital financial management under the informatization context, Jingguang L (2023) put forward a forecasting model for hospital financial prediction ^[1]. This model integrates various operational solutions with a deep belief network model to improve the monitoring and early warning functions of hospital financial software, indicating the potential of deep learning technology in financial prediction. Besides, Biljana M *et al.* (2023) studied the effect of Information and Communication Technology (ICT) on hospital financial performance by using Dynamic Balanced Scorecard (DBSC) method, which helps to reduce cost and increase revenue ^[2]. JihShong W (2023) used Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) to evaluate the financial efficiency of hospitals, find out the influencing factors and business strategies for increasing profit, and emphasize the practical significance of intelligent healthcare in improving the financial efficiency of hospitals ^[3]. Based on the background of the development of artificial intelligence, Mengxuan M (2022) analyzed the importance of intelligent finance in hospital financial management and suggested some measures to develop intelligent hospital finance according to artificial intelligence, with the purpose of enhancing the whole efficiency of hospital financial fund management ^[4]. These studies not only show the advances in hospital financial informatization made by different countries and regions but also reflect the global tendency of optimizing hospital financial management practices through technological innovation. Although foreign countries have achieved a significant progress in the informatization and intelligence of hospital financial management, there is still a need to explore and deepen the application of these technologies to adapt to the ever-changing medical environment and financial management problems, thus

promoting the high-quality development of hospital financial management.

2. Research innovation and academic contributions

Under the present economic situation, this research topic is one of the main discussions and has some innovative points, as follows:

2.1. Unique and innovative academic thinking

This project regards medical financial management as an evolving system and thoroughly investigates and fundamentally alters the existing medical financial management models. The new idea of “intelligent financial management” not only stresses the intelligent handling and examination of financial data but also stresses the comprehensive automation and intelligent improvement of financial management in public hospitals by applying information technology. This novel concept meets the complicated financial requirements by making full use of the potential of financial data with advanced techniques, adjusting the resource distribution and improving the ability of risk prediction and management.

2.2. Unique and innovative academic perspectives

In the viewpoint of academia, this research highlights that in the era of informatization, the improvement of public hospital financial management should attach more significance to the strategic role of data and its supportive function in decision-making. By establishing a systematic and data-analytical decision support system, it can reveal more detailed information hidden in financial data, thus providing better scientific and reasonable bases for the management of public hospitals. The novelty of this idea lies in the close combination of information technology with the strategic decision-making of public hospital financial management.

2.3. Unique and innovative research methods

In regards to the research methods, this project uses a comprehensive and multi-disciplinary approach which is appropriate for the situation of public medical financial management. It integrates case studies, data mining and artificial intelligence techniques to carry out detailed investigations and assessments of the informatization reform strategies for public hospital financial management. The special point of this method is that it is not only based on the traditional financial management and information technology theories but also introduces the newest artificial intelligence and big data analysis methods in order to discover innovative and more efficient financial management strategies and models. By conducting case studies of real public hospital financial management, the practicability and feasibility of the research findings can be guaranteed, thus improving the innovativeness and applicability of the project. This will provide a strong theoretical basis and practical suggestions for public hospital financial management.

3. Research focuses and challenges

Investigating this subject includes some important points and challenges. The points are listed below:

3.1. Financial process reengineering and integration with information technology

Studying methods and techniques for modifying financial procedures in public hospitals using information

technology. It includes the rearrangement of financial procedures by using technical devices such as automation systems and intelligent algorithms to improve operational efficiency and data accuracy. The focus is on combining the particular aspects of public health services with financial needs to achieve automation and intelligent financial operations.

3.2. Financial risk management innovation

Researching and utilizing sophisticated techniques for financial risk detection, evaluation and control in public medical institutions under the information technology environment. The emphasis is on improving the prediction and anticipation of risk management through big data analysis and artificial intelligence, particularly in dealing with extensive medical information and intricate insurance contracts.

3.3. Cost control and resource optimization

Studying the use of information technology in cost control and resource optimization in public hospitals. It involves the collection and analysis of data by information systems to provide better financial choices and resource distribution, with the objective of improving cost efficiency while ensuring the quality of medical services.

Regarding the difficulties, the following have been identified:

3.4. Data integration and data security

It is important to combine data from different sections and networks properly while ensuring data security and privacy during the financial informatization reform of public hospitals. This includes the planning and execution of effective data security measures in accordance with national and local data protection regulations. Improving informatization reform in public institutions needs not only advanced technology but also increasing the information technology knowledge and abilities of the financial and related staff. This includes overcoming the difficulty of effectively enhancing their acceptance of new systems, especially in areas with a large number of elderly people where technology acceptance may be low.

3.5. Continuous reform and system compatibility

With the constant development of technology, the financial management systems in public hospitals need continuous modifications and enhancements. It is an important problem to ensure the compatibility of new systems and to make smooth changes from the old systems to prevent disturbance of the regular work. Adequate planning for system migration and updates is necessary to reduce the effects on the daily hospital activities.

4. Reform strategies and implementation measures

To emphasize the research priorities and solve the above problems, after a thorough investigation, the following measures are suggested:

4.1. Integrate information technology with financial process optimization

4.1.1. Process diagnosis and needs analysis

In public institutions, owing to the growing medical service demand caused by population aging and financial burden, and the regional economic disparities and uneven distribution of medical resources in public hospitals,

this project will cooperate with the financial departments of different public medical organizations. By means of seminars and discussions, we will conduct a thorough investigation on the obstacles and inefficient parts in the present financial management procedures. Emphasis will be put on enhancing the service efficiency by using information technology, particularly in economically active but relatively shortage of resources areas like economic development zone and high-tech industrial zone.

4.1.2. Technology selection and customized development

Considering the fast progress in manufacturing and private enterprises, medical institutions have special financial management requirements, like the immediate requirement to improve working capital management and increase supply chain financial transparency. Thus, this project will choose and develop appropriate financial management software according to the local financial conditions, such as SAP Financials and Oracle Financials. The aim is to improve the abilities in automatic report generation, electronic invoice handling and advanced data analysis to satisfy the needs for financial transparency and adaptability to the rapidly growing regional economy.

4.1.3. Implementation and training

During the implementation stage, the chosen technical methods will be installed in public medical units. Considering the special situations of public hospitals, including different medical service requirements and different financial abilities, appropriate training schemes will be offered to make sure that the medical financial staff can operate the new systems properly. Moreover, it is important to set up a continuous feedback system to modify and improve the system according to the actual use in medical units, so that the system can adapt to the ever-changing environment and specific demands of public health care.

4.2. Build a highly accurate risk assessment model

4.2.1. Data integration and preprocessing

As an important economic area in the southeast of China, medical institutions, in order to match the development speed of the city, usually encounter the problem of unbalanced informatization construction. The financial data of the medical institutions are both large and complicated, with data silos and slow information updating, which is more common in private and small medical institutions. To solve these problems, this project will combine and improve the financial data from public medical institutions, including the detailed accounts of income, expenses, assets and liabilities. Advanced data cleaning and preprocessing methods will be used to guarantee the accuracy and usability of the data, especially for the medical service providers who need to react quickly to market changes.

4.2.2. Model building and training

In view of the increasing scale of the medical service market and the involvement of private hospitals, this research will establish a financial risk evaluation model tailored for public medical institutions. The model will combine machine learning and deep learning methods, not only considering common financial risk indices but also taking into account the special local risks faced by medical institutions, such as the fluctuation in the private medical market, policy adjustments and the effect of new medical needs. The model will be accurately trained and tested using real financial data to guarantee its reflection on the specific risk conditions.

4.2.3. Risk prediction and strategy formulation

Using the rigorously trained model, this project will predict and analyze potential future financial risks for public medical institutions. These analyses will cover not only current challenges such as medical cost control

and liquidity management but also predict potential risk mitigation and management strategies arising from changes in socioeconomic factors (e.g., changes international trade environment, tourism development driving demand for high-end medical services), ensuring that public medical institutions maintain financial stability and sustainable development in a rapidly evolving economic environment.

4.3. Adopt optimization strategies for resource allocation and cost control

4.3.1. In-depth financial data analysis

As an important economic position, medical institutions often encounter sudden increases in the demand for treating industrial accidents or occupational diseases, thus requiring stricter control over medical resources and costs. This research will apply statistical analysis and data mining methods to conduct a thorough examination of the financial data from public medical institutions, focusing on the relationship between medical services and specific industrial activities in different regions. It aims to study how to adjust the cost structure to meet the medical needs in high-risk industrial areas while ensuring the service quality, and to enhance the efficiency and accuracy of the fund flow.

4.3.2. Use of decision support tools

Considering the important position of public hospitals in the metropolitan area and the recent programs for building a healthy city (such as improving medical and health service facilities), this project intends to use advanced decision support tools like Tableau and Power BI for detailed analysis. These tools will assist hospitals in gaining a better understanding of the regional usage of resources and cost changes, especially concerning the distribution of resources in new commercial and residential zones. By means of visual data analysis, hospitals can offer targeted assistance to the demand hotspots within their service areas while maintaining financial stability.

Execution and evaluation of the strategies will be carried out in public medical institutions on a regular basis. Information tools, especially integrated medical health information systems, will be used to gather execution data and assess the cost saving and enhancement of resource utilization efficiency. According to the monitoring outcomes and modifications in medical needs and surroundings, the strategies will be modified promptly to achieve the best results. Furthermore, special care will be taken for the unusual seasonal fluctuations and major public events (like international trade fairs) which may lead to an increase in medical demand and require quick response and flexible resource distribution in medical institutions.

4.4. Promote financial management innovation and technology application

4.4.1. Analysis of market and technology trends

Public hospitals adopt rapidly advanced technologies and innovations particularly in medical financial management. Medical establishments attempt to incorporate these new technologies (like blockchain, artificial intelligence and big data analysis) efficiently to enhance the financial transparency and management effectiveness. The combination of these technologies is mainly intended to resolve the complicated financial issues resulting from specific economic activities such as a large amount of small and micro enterprises and family workshops. This study will focus on examining how these technologies can help public medical institutions to optimize the resource distribution, especially in benefiting the elderly population and improving the medical service quality.

4.4.2. Selection and evaluation of new projects

According to a thorough investigation of the market and technological developments, this project will choose

some projects with considerable practical significance and potential for innovation, particularly those improving the speed of medical data processing, data security and cost management in general hospitals. As an important region for immigration, general hospitals receive patients from various parts of the country and even foreign countries. The new projects will be tested in several medical institutions to evaluate their suitability and efficiency under different and multicultural medical situations. The experiments will concentrate on how these technologies assist the institutions in handling a large number of patients during peak times and emergencies, at the same time guaranteeing correct and distinct financial operations.

4.4.3. Full implementation and improvement

After the successful pilot stages, the confirmed new projects will be implemented in more medical institutions. A proper user feedback system will be set up during the implementation to obtain continuous feedback from all levels of medical service providers. These feedbacks will be utilized to modify and optimize the project strategies, so that the new systems can meet the operational requirements of public medical institutions under the changing medical demands and developing economic conditions. Additionally, with the increasing internationalization, improvement measures will take into account the addition of multilingual support and enhancement of cross-cultural communication to satisfy patients from various cultural backgrounds.

4.5. Establish a continuous improvement mechanism for financial management

4.5.1. Regular assessment and feedback collection

As a significant commercial and trading city located on the southeastern coast of China, the special geographical position and economic conditions require the medical institutions to deal with not only common medical financial management problems but also the complexity caused by a great number of migrant workers and international business operations. These factors lead to considerable seasonal variations in medical needs, causing high uncertainty in medical services and fund flows. To solve this, a regular evaluation system will be set up, which evaluates the efficiency of financial management strategies as well as collects information about the effectiveness of medical services, patient satisfaction and reactions to special economic activities. This evaluation can help disclose the direct and indirect effects of financial policies on the quality of medical services, particularly when there is an increase in medical demands during holidays and peak tourist seasons.

4.5.2. Problem analysis and solution formulation

When dealing with financial problems, which are closely connected to the regional economic development, like the rapid increase of private enterprises and special small commodity markets, the public medical institutions usually require to carry out certain strategic modifications in the medical insurance policies and the local government investment priorities. According to the evaluation outcomes, we shall determine the impacts that these local policy changes have on the medical financial management and propose specific solutions. This might involve adjusting the fund allocation patterns according to the economic features, optimizing the fee structures to match the local insurance policy changes, and improving the financial transparency for the medical service projects which are suitable for the unique business environment.

4.5.3. Continuous improvement and flexible adjustment

Considering the need to keep up with the fast-changing market and technology (like the development of digital medical devices and improvements to medical instruments), the geographical position as an important trade center

gives us advantages in introducing new technologies and attracting foreign investments. It provides opportunities for medical institutions to quickly adopt new technologies and at the same time increases the demands on their ability to adapt to new technologies. While implementing the solutions and improvement measures, we will continually assess the effectiveness of the new technologies in financial management, particularly focusing on how these technologies assist medical institutions in dealing with a large number of international patients and diverse multilingual service requirements, thus improving the operational efficiency and service quality of patients. This involves the multilingual optimization of service procedures and enhancement of intercultural communication, guaranteeing that all users, both local and international, can make full use of the new systems.

5. Conclusion

In the era of healthcare informatization, reforming public hospital financial management is essential for improving operational efficiency, financial transparency, and sustainable development. This study identified key challenges, including data silos, limited system functionality, inadequate risk management, and ineffective cost control, and proposed an intelligent financial management framework based on technologies such as big data, artificial intelligence, and blockchain. The findings suggest that integrating advanced information technologies into financial processes can enhance decision-making, strengthen risk assessment, optimize resource allocation, and improve cost management. Although challenges related to data security, personnel training, and system compatibility remain, appropriate governance mechanisms and continuous improvement strategies can support successful implementation. Overall, intelligent financial management provides a practical pathway for modernizing public hospital finance and promoting the high-quality development of the public healthcare system.

Disclosure statement

The authors declare no conflict of interest.

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