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САНАРИПТИК ТРАНСФОРМАЦИЯНЫН ФОНУНДА ООРУКАНАЛАРДЫ БАШКАРУУ МОДЕЛИН ОПТИМАЛДАШТЫРУУ ЖОЛУН ИЗИЛДӨӨ

Аннотация. Глобалдык санариптик экономиканын тез өнүгүшү менен саламаттыкты сактоо тармагы болуп көрбөгөндөй трансформация кысымына жана мүмкүнчүлүктөрүнө туш болууда. Саламаттыкты сактоо кызматынын системасынын негизги уюмдары катары ооруканалар санариптештирүү толкунунун шартында башкаруу моделдеринде терең өзгөрүүлөргө дуушар болууда, тажрыйбага негизделгенден маалыматтарга негизделгенге чейин жана эмгекти иерархиялык бөлүштүрүүдөн системалуу кызматташууга чейин. Бул макалада санариптик трансформация учурунда ооруканалар туш болгон башкаруудагы кыйынчылыктарга анализ берилет. Кытай жана эл аралык ооруканалардын типтүү мисалдарына жана учурдагы башкаруу структураларына таянуу менен ал процесстин фрагменттелиши, маалымат силосу жана артта калган талант механизмдери сыяктуу негизги маселелерди аныктайт. Мунун негизинде ооруканаларды башкарууну трансформациялоонун системалуу, стратегиялык жана акырындык мүнөзүнө басым жасоо менен "процесстерди реинжинирингге, платформа интеграциясына, уюштуруучулук реструктуризациялоого жана институционалдык кепилдиктерге" негизделген төрт өлчөмдүү оптималдаштыруу ыкмасы сунушталат. Жыйынтыктар менин өлкөмдө акылдуу ооруканаларды өнүктүрүү үчүн теориялык колдоо жана маалымдама бере алат.

Негизги сөздөр: цифровая трансформация, управление больницей, реинжиниринг процессов, интеграция информации, интеллектуальное здравоохранение, путь оптимизации управления.

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ИССЛЕДОВАНИЕ ПУТИ ОПТИМИЗАЦИИ МОДЕЛИ УПРАВЛЕНИЯ БОЛЬНИЦЕЙ В УСЛОВИЯХ ЦИФРОВОЙ ТРАНСФОРМАЦИИ

Аннотация. В условиях стремительного развития глобальной цифровой экономики сфера здравоохранения сталкивается с беспрецедентными требованиями к трансформации и новыми возможностями. Будучи ключевыми организациями системы здравоохранения, больницы претерпевают глубокие изменения в своих моделях управления на фоне волны цифровизации: от моделей, основанных на опыте, к моделям, основанным на данных, и от иерархического разделения труда к системному сотрудничеству. В данной статье анализируются узкие места в управлении, с которыми сталкиваются больницы в ходе цифровой трансформации. Опираясь на типичные примеры и существующие структуры управления китайских и международных больниц, авторы выявляют ключевые проблемы, такие как фрагментация процессов, разрозненность информации и отстающие механизмы управления кадрами. На основе этого предлагается четырёхмерный подход к оптимизации, основанный на «реинжиниринге процессов, интеграции платформ, организационной реструктуризации и институциональных гарантиях», подчеркивающий системный, стратегический и постепенный характер трансформации управления больницами. Полученные результаты могут послужить теоретическим обоснованием и ориентиром для развития «умных» больниц в моей стране.

Ключевые слова: санариптик трансформация, ооорукана башкаруу, процесс реинженеринги, маалыматтык интеграция, акылдуу саламаттык сактоо, башкаруу оптималдаштыруу жолу.

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RESEARCH ON THE OPTIMIZATION PATH OF HOSPITAL MANAGEMENT MODEL UNDER THE BACKGROUND OF DIGITAL TRANSFORMATION

Abstract. With the rapid development of the global digital economy, the healthcare industry is facing unprecedented transformation pressures and opportunities. As the core organizations of the healthcare service system, hospitals are undergoing profound changes in their management models amidst the wave of digitalization, from experience-based to data-driven, and from hierarchical division of labor to systemic collaboration. This article analyzes the management bottlenecks faced by hospitals during their digital transformation. Drawing on typical case studies and existing management structures of Chinese and international hospitals, it identifies key issues such as process fragmentation, information silos, and lagging talent mechanisms. Based on this, a four-dimensional optimization approach centered on "process reengineering, platform integration, organizational restructuring, and institutional guarantees" is proposed, emphasizing the systematic, strategic, and gradual nature of hospital management transformation. The findings can provide theoretical support and a reference for the development of smart hospitals in my country.

Key words: digital transformation, hospital management, process reengineering, information integration, smart healthcare, management optimization path.

INTRODUCTION

In recent years, with the in-depth implementation of the "Healthy China 2030" strategy and the wide application of new-generation information technologies such as artificial intelligence, the Internet of Things, and cloud computing, digital transformation has become a key driving force for promoting the high-quality development of hospitals. However, the management systems and organizational structures of hospitals often struggle to adapt quickly to this transformation process, leading to a series of problems such as the lack of interconnection among systems, low data utilization efficiency, and uneven information capabilities among medical staff. Digitalization is not merely a technological upgrade, but also a profound innovation in management paradigms. Therefore, this article aims to explore from the perspective of the integration of management and information systems how to reshape the hospital management model in the digital context, not only responding to the practical demands of technological development but also laying a theoretical foundation and implementation framework for the continuous optimization of hospital operations in the future.

1. The connotation of digital transformation and its impact on hospital management

1.1 Core Definition and Stage Division of Digital Transformation

Digital transformation is not merely a simple accumulation of technologies; rather, it is a systematic change process that takes digital technology as the core driving force and comprehensively and deeply reconstructs an organization's strategy, operational model, business processes, service methods, and value creation system. The essence lies in leveraging data elements and achieving optimal resource allocation, efficiency improvement and model innovation through technological empowerment. To understand this connotation, it is necessary to grasp the core stage of its evolution: the basic stage is informatization, which focuses on the electronic recording and management of business processes, such as the application of early hospital information systems (HIS) [1]. Then comes networking, emphasizing information interconnection and interoperability to achieve cross-departmental and cross-institutional data sharing and collaboration, such as the circulation of electronic medical records (EMR) both inside and outside the hospital. When advancing to the intelligent stage, it relies on technologies such as artificial intelligence (AI) and big data analysis to endow the system with the capabilities of learning, reasoning and auxiliary decision-making. Clinical decision support systems (CDSS) and AI-assisted diagnosis and treatment are typical representatives. The future advanced

form points to digital twins, aiming to build a virtual mapping of physical hospitals to achieve real-time monitoring, simulation prediction and optimized control. The typical technical tools widely applied in the current digital transformation of hospitals, such as HIS, EMR, CDSS, telemedicine platforms, and various AI-assisted diagnostic tools, are concrete manifestations of the technological evolution at these stages. Together, they form the technical foundation of hospital digitalization [2].

Table 1. Main Challenges in Hospital Management During Digital Transformation

Category of Issue	Manifestation
Information Fragmentation	System silos, data not shared
Process Disconnection	Visitation, medication, billing nodes not integrated
Staff Resistance	Medical staff unfamiliar with the system, efficiency decreases
Lack of Governance Mechanism	No performance incentives or assessment systems to support IT system implementation

1.2 The Systemic Impact of Digital Transformation on Hospital Management

The wave of digital transformation is profoundly reshaping all aspects of hospital management and giving rise to systemic changes. In the dimension of process management, the traditional situation of relying on manual operations, fragmented processes among various departments, and lagging information transmission is being overturned. Instead, it is driven by the full-process data of patient visits, achieving seamless connection and automated flow of links such as appointment, registration, diagnosis and treatment, examination, drug collection, settlement, and follow-up, significantly improving efficiency and reducing errors. At the decision-making mechanism level, the past model that mainly relied on the personal experience and intuition of managers for manual judgment is facing challenges, and data insight is gradually becoming the core. By integrating multi-source heterogeneous data such as clinical, operational, financial, and equipment data, and applying big data analysis technology, hospital managers can obtain more accurate and real-time operational situation awareness, resource allocation optimization suggestions, and risk warnings, promoting the transformation of decision-making from experience-driven to intelligent decision-making supported by data insights [3]. Correspondingly, the human resource structure of hospitals has also undergone significant adjustments, breaking the previous pattern where medical professionals dominated and IT personnel only provided back-end support. There is a sharp increase in the demand for medical, information and engineering compound talents in hospitals who possess medical knowledge, information engineering capabilities and management qualities. They have become the key bridge connecting technology and management and promoting business innovation. In terms of service methods, digital transformation has broken the shackles of medical services being limited by physical space and single on-site channels, and has built a multi-channel service network that integrates online and offline, as well as in-hospital and out-of-hospital services. Patients can conduct online consultations, make appointments, check reports and manage chronic diseases through mobile applications and Internet hospital platforms. Telemedicine provides expert services across geographical restrictions, achieving a revolutionary improvement in service accessibility and convenience.

1.3 The Phenomenon of "Digital Anxiety" in Hospital Management and the Predicament of

Transformation

However, this profound transformation is not an easy path. In the process of promoting digital transformation, hospitals generally encounter the phenomenon of "digital anxiety" and face multiple transformation predicaments. The primary challenge lies in the fact that the rapid pace of technological iteration is difficult to keep pace with the relatively lagging management model updates in hospitals. The continuous emergence of new technologies and systems requires management concepts, organizational structures, rules and regulations, and work processes to be adapted to them. However, the inherent management systems of hospitals often have inertia, and the speed of change cannot keep up with the pace of technological development, resulting in the inability to fully exert the effectiveness of technology [4]. Secondly, the separation of responsibilities between the IT department and business management departments (especially core departments such as medical care, nursing, and administration) constitutes a significant obstacle. The technical department focuses on the stable operation and functional realization of the system, while the business department pays attention to the actual application effect and user experience. There are differences in the goals, discourse systems and work priorities between the two sides. There is a lack of effective collaboration mechanisms and common language, which easily leads to the phenomenon of "two skins" and hinders the deep integration of technology and business. Furthermore, the significant disparity in information literacy within the medical staff group is another key pain point. Some younger or more technically experienced medical staff can quickly adapt to and effectively utilize new tools, while some senior experts or older employees may encounter greater learning difficulties and operational obstacles. This disparity not only affects the popularization and application effect of new technologies, but may also lead to uneven workload, resistance and even impact on team collaboration, becoming a significant obstacle to the implementation of digital transformation. These predicaments profoundly reflect that digital transformation is not merely a technological upgrade, but also a complex systematic project involving organizational culture, management models and personnel capabilities.

2. Typical experiences of optimizing hospital management models at home and abroad

2.1 Insights from Cases of the United States, Germany, Japan and Other Countries

The traditional management model of hospitals is increasingly revealing structural flaws when responding to modern medical demands. The core issue is first reflected in the rigidity of the hierarchical management system. Decision-making instructions need to be passed down through multiple levels such as the president, vice president, functional departments, department heads, and head nurses, resulting in severe information attenuation and slow response speed. Especially in emergency situations, it may delay the opportunity for handling. Secondly, although the organizational structure with departments as independent operating units has strengthened professional division of labor, it has given rise to a serious phenomenon of "acting independently" **[5].** Each department has made repeated investments in equipment procurement, consumable management, data storage and other aspects, resulting in a waste of resources. Cross-departmental collaboration, such as multidisciplinary team (MDT) consultations, is often difficult to carry out efficiently due to the division of interests and communication barriers. The more prominent contradiction lies in the fragmentation of non-clinical support systems. Key modules such as financial settlement, drug management, and logistical support lack a unified and collaborative platform. For instance, patient payment information is not connected in real time with the pharmacy's drug dispensing system, leading to frequent occurrences of "running errands and queuing", which has become a bottleneck for service efficiency. These traditional architectural features are increasingly out of place in the digital age.

2.2 Practical Exploration in Some Domestic Demonstration Hospitals

When the wave of digital transformation swept into the medical field, the introduction of technological tools not only failed to automatically resolve existing contradictions but also exposed new problems arising from the collision of the old and new systems. The problem of information fragmentation is the most prominent. Systems such as HIS, LIS, and PACS built at different times form "data silos", making it impossible to retrieve key patient information across departments. Doctors have to log in to multiple platforms repeatedly to piece together a complete diagnosis and treatment profile. The fragmentation of processes is further magnified in digital scenarios. For instance, the management of inpatient visits, the execution of medication, and the settlement of expenses remain fragmented. The intelligent terminals and the back-end systems have not achieved full-chain integration, and the advantages of process automation that digitalization should have brought have been eroded. Particularly worthy of attention is the personnel resistance behavior. Some medical staff, due to insufficient operation training or being accustomed to relying on the old mode, experience a sense of frustration when facing the new system, feeling that their efficiency does not increase but decreases instead [6]. A typical manifestation is the parallel operation of both tracks (handwritten records + system entry), which increases redundant labor. The deep-seated contradiction is also reflected in the absence of a digital governance mechanism [7]. After the IT systems are launched, most hospitals lack corresponding performance evaluation standards and assessment incentive systems. The application effect of technology cannot be quantified and measured, resulting in a vicious circle of "emphasizing construction over operation". These obstacles can be systematically summarized as follows:

Table 2. Overview of the Optimization Characteristics of Digital Management in Foreign Hospitals

Problem Category	Typical Manifestations	Impact Level
Information Fragmentation	Siloed systems, Incompatible data standards	High
Process Disintegration	Non-integrated nodes (e.g., visitation-medication-billing)	Critical
Staff Resistance	Low digital literacy, Workflow disruption	Medium-High
Governance Deficiency	Absence of KPI systems, Lack of incentive mechanisms	High

2.3 Summary of Case Experience and Reflection on Applicability

At its root, the essence of the current predicament lies in the deep disconnection between "unilateral technological advancement" and "lagging management mechanisms". Digital transformation is by no means a simple upgrade of information systems or the intelligent replacement of equipment. Its core is a revolutionary Reengineering of Management paradigms and an Organizational Evolution of organizational functions. The deployment of technology merely addressed the issue of "tool availability", but failed to simultaneously reconstruct the corresponding management system: the traditional hierarchical system did not transform into a networked collaborative structure, resulting in

data flow being unable to drive decision-making flow. The departmental walls have not been removed, which limits technological empowerment to administrative boundaries [8]. The talent assessment criteria still mainly focus on clinical output, while neglecting the weight of digital skills. More crucially, hospital management often views digital transformation as a purely technical project rather than a systematic management innovation involving strategic positioning, organizational culture, business processes, and human resources. This cognitive bias leads to an excessive inclination of resources towards hardware investment while neglecting soft elements such as the reconstruction of management standards, the design of cross-departmental collaboration mechanisms, and the construction of digital culture, ultimately resulting in the paradox of "advanced technology carrying backward management". Only by embedding technology throughout the entire process of management reengineering and promoting the evolution of organizations towards data-driven, patient-centered, and agile responsivity can the current structural predicament be broken through.

3. Construction of Optimization Paths for Hospital Management Models in the Digital Context

3.1 Optimization Principles and Logical Structure

The digital transformation and optimization of hospital management models need to follow three core principles to construct their logical framework. The primary principle is goal-oriented, that is, taking improving the efficiency of medical services, ensuring medical quality and patient safety, and enhancing the experience of patients and medical staff as the fundamental starting point and ultimate test standard. Secondly, the principle of system synergy requires breaking the traditional fragmentation of elements, promoting the organic integration and dynamic adaptation of personnel organization, business processes, data resources and technical systems, and achieving the maximization of overall efficiency [9]. Thirdly, the principle of stratification and step by step emphasizes that the transformation should be based on the current foundation and adopt a strategy of starting from point to area and progressing step by step. Breakthroughs should be prioritized in core clinical departments such as emergency and imaging, and after accumulating experience, gradually expand to management support departments such as pharmacy, finance, and logistics, ultimately achieving collaborative optimization throughout the hospital. These three principles together constitute the underlying logic and action guide for optimizing path design.

3.2 Optimization Path One: Process Reengineering and Automation

Based on the goal-oriented principle, the primary optimization path is to digitally restructure and automate the key business processes. The medical service process needs to be standardized and transformed to eliminate redundant links. For instance, the entire path from registration → waiting for consultation → seeing a doctor → examination → treatment → payment → discharge should be modeled with data, and an AI-assisted decision-making system (such as intelligent triage and medication conflict early warning) should be embedded to achieve intelligent process drive (as shown in Figure 1). For the management approval process (such as procurement applications, expense reimbursements, and shift adjustments), electronic circulation and paperless approval should be fully implemented [10]. For standardized affairs, the rule engine should be activated to achieve automatic approval, significantly reducing the processing cycle. A deeper optimization lies in establishing a dual collaborative mechanism of "process + platform" : on the one hand, ensuring seamless cross-departmental business connection through a process engine; on the other hand, building a unified workflow platform to integrate HIS, ERP, OA and other systems, forming an efficient model of "one-stop acceptance at the front end and automated processing at the back end".

3.3 Optimization Path Two: Build an integrated data platform

To break through information silos and unlock the value of data, it is necessary to systematically build

a hospital-level data hub. The core task is to establish a comprehensive master data management system, unify the patient master index (MPI) to ensure identity consistency, standardize the data structure of electronic medical records (EMR) to achieve clinical information interoperability, and integrate operational performance data to support management decisions. On this basis, a Healthcare Data Middle Platform is constructed as the digital infrastructure. Through ETL tools, multi-source data from clinical, management and scientific research are integrated to provide unified data cleaning, storage, computing and analysis services. This platform needs to support three core scenarios: intelligent medical applications that support clinical diagnosis and treatment (such as CDSS, risk prediction models), operational decision-making systems that empower managers (such as resource scheduling dashboards, cost-benefit analysis), and scientific research collaboration platforms that accelerate innovation (such as real-world research databases), ultimately achieving a "one data for multiple uses, three-in-one" data empowerment ecosystem.

3.3 Optimization Path Three: Matching institutional guarantees with assessment mechanisms

Sustainable transformation requires strong support from systems and assessment mechanisms. The performance evaluation system must add special indicators for informatization, such as:

Table 3. shows that the performance evaluation system must add special indicators for informatization

Evaluation Dimension	Key Performance Indicators (KPIs)	Target Value
Process Efficiency	Outpatient wait time, Bed turnover rate	↓30%, ↑15%
System Utilization	EMR adoption rate, AI tool usage frequency	>95%, >80%
Data Governance	Data accuracy rate, Inter-system	

The reform of the incentive mechanism requires that the effectiveness of digital transformation (such as process optimization indicators and system usage rates) be incorporated into the performance assessment of departments and directly linked to bonus distribution and commendation. At the institutional guarantee level, it is necessary to introduce the "Hospital Data Security Management Measures" to standardize the hierarchical protection and encrypted transmission of data, establish an ethics review committee to supervise the fairness of AI algorithms and the protection of patient privacy, and build a compliance bottom line for digital development.

CONCLUSION

The digital transformation of hospitals is a systematic project, involving multiple dimensions such as process reconfiguration, technology integration, organizational change and institutional innovation. This article analyzes the structural problems currently faced by hospital management, draws on advanced experiences at home and abroad, and constructs an optimization model centered on patients, supported by data, followed by collaboration, and guaranteed by governance. In the practice of transformation, hospitals should take problems as the orientation, and in combination with their own scale, resources and regional characteristics, gradually promote the digital upgrade of the management system. Future research can further delve into aspects such as medical culture, organizational learning capabilities, and change management mechanisms, providing more comprehensive theoretical support and practical solutions for promoting the modernization of hospital governance in the digital age.

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