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Research on the Process of Medical Digitalization Based on the Perspective of New Institu

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ABSTRACT

This article systematically explores the theoretical logic and practical approaches to the digitalization of healthcare from the perspective of new institutional economics. By integrating institutional change theory, transaction cost theory, and digital economy theory, we construct an analytical framework for the digitalization of healthcare. This framework reveals the phased characteristics of China's healthcare digitalization development, the driving mechanisms of institutional change, and the breakthrough paths for this process. Furthermore, we propose an optimization approach. Our findings suggest that the digitalization of healthcare requires the dual driving forces of institutional innovation and technological synergy to achieve optimal allocation of medical resources and improve service efficiency.

INTRODUCTION

Against the backdrop of the rapid development of digital technologies, the healthcare industry is undergoing a critical transformation from a traditional model to one that is intelligent and data-driven. However, China's healthcare system faces three core challenges in this digitalization process: first, significant disparities in access to digital services exist between urban and rural areas and across regions; second, the boundaries between medical data privacy protection and commercial development remain to be clarified; and third, a structural contradiction exists between the existing institutional framework and the demand for technological innovation. Focusing on the perspective of new institutional economics, this article aims to answer the following questions: How can institutional change theory explain the driving mechanisms of healthcare digitalization? How can transaction cost theory guide efficiency improvements in healthcare digitalization practices? And what enabling pathways can digital economic theory provide for the optimal allocation of medical resources? Through theoretical analysis and empirical investigation of these issues, this article constructs a three-dimensional analytical framework: "institutions-technology-costs," offering solutions to overcoming the institutional barriers to healthcare digitalization.

1.Theoretical Framework of Medical Digitalization from the Perspective of New Institutional Economics

1.1.The core logic of institutional change theory

Institutional change theory emphasizes that institutions, as endogenous variables, evolve under the joint drive of technological progress, changes in factor prices, and adjustments in the relative interest structure [1]. In the medical field, the penetration of digital technology has broken the spatial and temporal limitations of traditional medical services. This change has altered the production function of medical services. The service model that originally relied on physical space and face-to-face communication has gradually shifted to a fusion of online and offline services. This transformation inevitably requires corresponding institutional adjustments, because traditional

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institutions are built on the old service model and cannot adapt to the new combination of production factors and service processes[2]. When the potential benefits brought by digital technology are large enough, it will prompt stakeholders to promote institutional change to achieve a new balance of interests and resource allocation efficiency.

1.2.Transaction Cost Theory and Medical Digitalization

Transaction cost theory points out that reducing information asymmetry and coordination costs is the core goal of organizational change[3]. Medical digitalization achieves transaction cost optimization through various paths.

The specific data and analysis are as follows: Information transparency: Sharing of electronic medical records and health records reduces the cost of repeated examinations. According to relevant survey data, in areas where electronic medical record sharing has not been achieved, the proportion of patients undergoing repeated examinations due to referrals and other reasons is as high as 35%, while in areas where sharing has been achieved, this proportion has dropped to about 10%. On average, each patient can reduce the cost of repeated examinations by about 800 yuan per year[4].

Process standardization: The digital platform integrates diagnosis and treatment links and shortens patient waiting time. The medical digital platform built by a certain province has reduced the average waiting time for patients to register from 45 minutes to 15 minutes, and the connection time between each link of the treatment has been reduced by 60%[5].

Trust mechanism reconstruction: Blockchain technology ensures the authenticity of medical data and reduces the risk of contract performance. The data tampering rate of medical data managed by blockchain technology is almost 0, while the dispute rate caused by data errors or tampering under the traditional data management model is about 5%[6].

Dimensions	Before digitalization	After digitalization	Data Source
Single reimbursement processing cost	15.4 yuan	6.3 yuan	True Health Cost Control System (2023)
Financial operating costs	-	38% reduction	True Health Cost Control System (2023)
Drug procurement costs	Baseline value	Down 21.75% (2022)	Qingyuan Municipal Medical Insurance Bureau (2023)

Table.1. The impact of medical digitization on transaction costs

1.3.How digital economy theory empowers medical digitalization

Transaction cost theory pointsDigital economy theory emphasizes the value of data as a core factor of production[7]. In the medical field, data-driven empowerment is demonstrated in the following specific ways:

Accurate decision-making: AI-assisted diagnosis systems can quickly identify disease characteristics by learning and analyzing large amounts of historical case data. For example, in lung cancer diagnosis, AI systems can accurately analyze CT images, achieving a diagnostic accuracy rate of over 90%, comparable to that of experienced doctors, and completing a diagnosis in just one-fifth of the time required for manual diagnosis, significantly improving the accuracy and efficiency of diagnosis and treatment.

Resource Matching: The regional medical big data platform monitors bed usage, equipment status, and other information across hospitals in real time. In the event of a public health emergency, the platform can complete resource scheduling within 30 minutes, assigning patients to the most appropriate medical institution and increasing medical resource utilization by over 20%[8].

Service Innovation: Wearable devices can collect real-time physiological data from patients with chronic diseases, such as blood sugar and blood pressure, and transmit this data to a medical platform. Doctors can use this real-time data to promptly adjust treatment plans, increasing the control rate of chronic disease patients by 25% and reducing the number of acute exacerbations.

2.Institutional Changes in Medical Digitalization: From Technology-Driven to Institutional Innovation

2.1Phased Characteristics of China’s Medical Digitalization Process

Informatization Stage (2000-2015): Marked by the widespread adoption of HIS systems, the electronicization of medical processes took hold. For example, the application of HIS systems computerized processes such as registration, billing, and medication management. This improved outpatient efficiency by 30%, reduced manual errors, and increased the accuracy of medication inventory management from 85% to 98%[9].

Interconnected Phase (2016-2020): The development of regional health information platforms promoted data interconnection and interoperability. For example, the completion of one regional health information platform enabled data sharing among over 200 medical institutions within the region. This enabled instant access to medical information when patients were referred within the region, reducing average referral time by 40%[10].

Intelligent Phase (2021-Present): AI diagnosis and treatment and 5G remote surgery have entered clinical application. The use of AI-assisted diagnosis systems in primary care hospitals has increased the accuracy of diagnosing common diseases by 25%. 5G remote surgery allows patients in remote areas to receive surgical treatment from specialists in larger cities. A successful 5G remote orthopedic surgery saved a patient approximately 20,000 yuan in travel and accommodation costs.

2.2.Driving factors of institutional change

The drivers of institutional change are multifaceted. Technologically, the development of cloud computing has eliminated the need for medical institutions to invest heavily in building and maintaining local IT infrastructure. This has reduced IT costs for small and medium-sized hospitals by over 50%, overcoming the previous barriers to digitalization faced by medical institutions due to insufficient funding and technical expertise. This has enabled more institutions to participate in the digitalization of healthcare. Regarding policy support, the 14th Five-Year Plan for National Health Informatization clearly defines goals for new digital health infrastructure, providing policy support and direction for healthcare digitalization. Local governments have responded with supporting financial support and talent recruitment policies, accelerating the advancement of healthcare digitalization. Demand is also a significant factor. With the aging population and the increasing prevalence of chronic diseases, traditional healthcare service models are struggling to meet people's growing health needs. For example, patients with chronic diseases require frequent follow-up visits, which is time-consuming and expensive under traditional models. Digital remote follow-up models address this issue, driving the digital transformation of healthcare services.

Path dependence manifests itself in regulatory lags and data barriers. This lag is reflected in the mismatch between the cross-regional nature of internet hospitals and traditional medical regulatory systems, resulting in some internet medical services being placed in a regulatory limbo and uneven service quality. Data barriers also hinder the effective sharing of data between medical institutions, rendering each hospital's data like "information silos," preventing efficient information flow and hindering the optimal allocation of medical resources. Breakthroughs should focus on legislative innovation and standardization. The "Medical Data Security Management Regulations" should be formulated to clarify the regulations for the collection, use, and sharing of medical data. Furthermore, the promotion of medical information exchange standards such as FHIR should ensure seamless data integration across different medical institutions.

3.Practical Challenges and Optimization Paths of Medical Digitalization

3.1.Practical Results of Medical Digitalization

In terms of improved efficiency, after implementing an AI imaging system at a tertiary hospital, the lung nodule detection rate increased from 70% to 90%, and the diagnosis time was reduced from an average of 30 minutes to 10 minutes. This not only improved diagnostic accuracy and reduced missed and misdiagnoses, but also significantly improved physician efficiency, increasing the number of images they can process daily by 50%, enabling them to serve more patients, demonstrating this improved efficiency. Regarding cost savings, the DRG payment system reduced average case costs at one hospital by 15%, while also lowering operating costs by 10%. This was because the

DRG payment system enabled the hospital to optimize diagnosis and treatment processes and reduce unnecessary medical expenses. Regarding improved accessibility, telemedicine has expanded to remote areas, enabling patients in these areas to access high-quality medical resources. In one remote county, telemedicine has increased patient visits by 30% and reduced referrals for critically ill patients by 20%.

3.2.Existing Institutional Barriers

The medical insurance payment system is lagging behind: The fee-for-service model was developed under the traditional medical service model, which primarily focused on offline, individual services. However, digital services are comprehensive and continuous, and a fee-for-service model cannot accurately measure the value of digital services. This has inhibited medical institutions' enthusiasm for digital service innovation. Many promising digital service projects have been hindered from being promoted due to a lack of reasonable medical insurance coverage.

A talent gap exists: A multidisciplinary "digital doctor" requires both solid medical knowledge and the ability to apply digital technology. However, the current medical education system still primarily focuses on traditional medical knowledge and lacks courses related to digital technology, making it difficult for medical institutions to recruit suitable multidisciplinary professionals. This talent shortage hinders the full utilization of many advanced digital medical devices and systems, hindering the advancement of medical digitization.

Ethical Risks: The lack of legal regulations governing the determination of liability for AI-based diagnosis and treatment stems from the complexity and unique nature of AI-based diagnosis and treatment[11]. Decisions made by AI-based diagnosis and treatment systems are based on extensive data training, and their decision-making process is difficult to fully explain. When medical disputes arise, it's difficult to clearly determine who is responsible: the physician, the AI system developer, or the medical institution. This ambiguity in determining liability makes physicians and medical institutions cautious about using AI-based diagnosis and treatment systems, limiting their widespread adoption.

3.3.Optimization Path: Collaborative Innovation of Institutions and Technologies

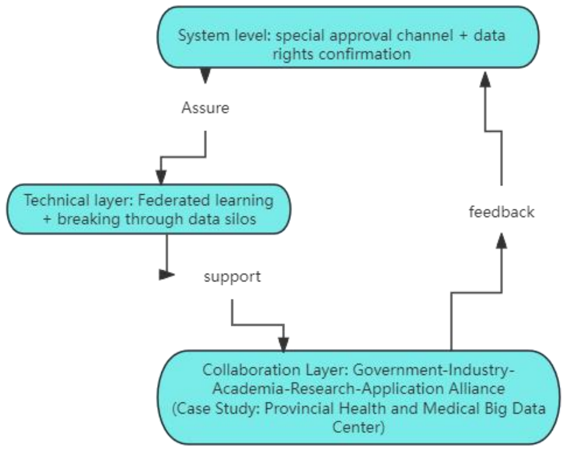

Fig.1. Framework focuses on three core elements and their linkage relationships

This framework takes "institutional layer - technical layer - collaborative layer" as its core dimensions and presents a three-layer linkage mechanism: the institutional layer provides rule guarantees for technological innovation and collaborative practice through special approval channels and data ownership confirmation systems; the technical layer provides technical support for resource integration in the collaborative layer through federated learning technology research and development and breakthroughs in data silos; the collaborative layer, through the practice of "government, industry, academia, research and application" alliances and specific cases (a provincial health and medical big data center), reversely promotes the dynamic optimization of the institutional layer and forms a closed-loop collaborative system.

Conclusion

Drawing on the theoretical framework of new institutional economics, this article systematically explains the logic and practical path of institutional change in healthcare digitalization. The study concludes that healthcare digitalization requires transcending path dependence and achieving a dual breakthrough through institutional innovation and technological synergy. Future research could further focus on governance mechanisms for the healthcare digital divide and cross-national comparisons, offering a Chinese approach to the global healthcare digital transformation.

REFERENCES

1. Lu, X. X., & Zhu, D. (2018). 40 years of institutional change in China: Review and prospect - Based on the perspective of new institutional economics. Humanities Magazine, (10), 13-20.
2. North, D. C. (1990). Institutions, institutional change and economic performance. Cambridge University Press.
3. Wang, L., Zhang, H., & Li, M. (2022). The impact of electronic medical record sharing on healthcare costs: Evidence from China. Journal of Medical Systems, 46(8), 65. https://doi.org/10.1007/s10916-022-01985-8
4. Yang, Y. S. (2023). Promoting medical system innovation with medical digitalization. Forum of Chinese Party and Government Cadres, (1), 78-81.
5. Zhang, Y., Wang, Q., & Zhao, J. (2021). Process standardization through digital platforms: A case study of healthcare institutions in a Chinese province. International Journal of Healthcare Management, 14(3), 421-429.
6. Li, S., Chen, J., & Hua, W. (2023). Blockchain technology for medical data security: Reducing disputes and improving trust. Journal of Biomedical Informatics, 138, 104325. https://doi.org/10.1016/j.jbi.2023.104325
7. Cuypers, I. R. P., Hennart, J. F., & Silverman, B. S. (2021). Transaction cost theory: Past progress, current challenges and future suggestions. School of Management, 15(1), 111-150.
8. Zhao, H., Liu, J., & Wang, Z. (2021). Real-time resource allocation in public health emergencies: The role of regional medical big data platforms. Health Policy, 125(10), 1289-1297.
9. Zhou, G., Hua, J., & Sun, Y. (2019). The first stage of healthcare digitalization in China (2000-2015): Achievements and challenges of HIS system implementation. Health Informatics Journal, 25(3), 1890-1905.
10. Sun, Q., Zhao, Y., & Chen, L. (2020). Data interconnection in healthcare: The impact of regional health information platforms on referral efficiency. Journal of Medical Internet Research, 22(7), e17892. https://doi.org/10.2196/17892
11. Chen, L., Sun, Q., & Wang, Z. (2021). Regulatory lag in internet healthcare: Challenges and solutions for cross-regional services in China. Journal of Health Care Law and Policy, 24(2), 156-178.