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A Comparative Review of the DRGs Reforms in China and the U.S.: Similarities, Innovations, and Recommendations

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Abstract: This research aims to identify the main similarities, differences, innovations, and challenges faced by the Diagnosis-Related Groups (s) health insurance payment reforms between the two largest world economies, the United States and China. The U.S. government initiated its DRGs reform in 1983 through the Medicare system to restrain its escalating medical service costs. The system upgraded to the Medicare Severity Diagnosis Related Groups (MS-DRGs) system later, which pays more attention to healthcare quality and patient outcomes. In contrast, China's engagement with DRGs payment reforms began much later, with its first attempt in Beijing in 2011. After years, China has progressively adopted the DRGs system into its medical insurance and hospitals. The literature reviews and case studies helped to find out that both economies share similarities in their DRGs reforms. For example, a transition from a Fee-for-Service (FFS) medical insurance settlement system to a DRGs-based system. Moreover, they share common goals of controlling total medical costs and enhancing healthcare service quality. However, there are also significant differences existing in their reform environments and functions of the government and market. Furthermore, the popularity of relevant technologies and the ability to process and collect data are also disparate. This study concludes that the implementation of DRGs payment reforms have had positive impacts on the health insurance systems for both countries, yet they still encounter challenges such as uneven regulatory intensity, policy uncertainties, and insufficient technological applications.

Keywords: DRGs Reforms, Similarities, Innovations, Recommendations.

1. Introduction

The U.S. healthcare framework, like its mixed economy model, is primarily based on a combination of private and public insurance. The U.S. public insurance (such as Medicare and Medicaid) mainly caters to the needs of specific groups of people, such as the elderly, low-income families and people with disabilities. China, on the other hand, has adopted a more centralized approach to healthcare regulation and financing. While there are a few private healthcare insurers in China, they usually only act as a supplement to the state-run medical insurance. The more commonly used social healthcare system is dominated by state-controlled basic medical insurance schemes.

The DRGs model was proposed by two Yale University scholars in the 1960s to categories patients and reimburse hospitals accordingly. First, hospitals group patients with the same disease or who are likely to use the same medical resources into the same group. Then, a fixed amount of medical funding

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is set for each group. The income (reimbursement amount) received by the hospital after treating the patient is only determined by the group to which the patient belongs, not the actual cost of the patient's treatment. Subsequently, in 1983, in order to alleviate rising medical costs, diagnosis-related groups (DRGs) were gradually incorporated into the United States to reduce unnecessary medical expenses and waste of resources. As for China, its first DRGs healthcare payment system reform began in Beijing in 2011, with a similar target of addressing rising healthcare costs and inefficient resource utilization. By 2021, the Chinese government has formulated a three-year DRGs reform plan, demonstrating its determination to completely change the current medical insurance payment and reimbursement structure.

In the U.S., the DRGs payment system has become an essential part of the public insurance framework because the system effectively improved the ability of health insurers to predict and manage healthcare costs. In China, the DRGs system achieved rapid spread due to its alignment with China's policy objectives, which is to obtain sustainable national insurance under the stress of an ageing population plus the huge medical expenses paid during the COVID-19 pandemic.

As the Chinese DRGs reform plan approaches its culmination, a thorough evaluation and comparison of the DRGs models operating in the U.S. and China could provide both academic and practical value. Through a comprehensive examination of implementation, highlighting similarities, differences, and innovative practices of interdisciplinary topics could hopefully enrich the academic discourse in related fields such as economics, public health, and healthcare management.

This research also seeks to enhance the global understanding of healthcare reform. By clarifying how DRGs systems can be optimized to improve cost management, care quality, and overall system efficiency, this study aims to provide practical recommendations for policymakers and healthcare administrators. Furthermore, the findings from this comparative analysis could serve as a model for other countries exploring similar reforms, ultimately contributing to the effectiveness and sustainability of healthcare systems around the world [1].

2. Case Description

In 1991, the DRGs system was officially introduced in the U.S. commercial insurance market as a vital part of private insurance payments, signaling a gradually shifted medical payment method in the United States from the traditional fee-for-service (FFS) model to a system that pays more attention to cost control and medical efficiency. In 2007, the birth of MS-DRGs (Medicare Severity Diagnosis Related Groups), which is an important improvement to the original DRGs system, further refined the patient group classification according to patients' conditions and made the total cost prediction even more accurate. At present, the MS-DRGs payment method has become a vital part of the U.S. medical insurance payment system and is widely used in Medicare, Medicaid and commercial insurance. The system is highly standardized and refined and includes 766 disease groups that cover a range of different patients' conditions and their treatment needs. Other features of the MS-DRGs include mature information and data management, as well as benign competition brought within the U.S. medical industry [2].

Although DRGs payment reform in China started relatively late, it has generally been a quick process in recent years. For example, from 2016 to 2021, many hospitals in provinces such as Guangdong, Shaanxi, and Liaoning began the DRGs payment pilots. In 2021, China's National Healthcare Security Administration issued the Notice on Issuing the Three-Year Action Plan for DRG/DIP Payment Reform, with the introduction of China's original DIP (Diagnosis-Intervention Packet) payment plan, and an aggressive goal to have all medical institutions in China to get away from fee-for-service (FFS) model and complete the DRG/DIP payment reform task by the end of 2024. However, as of January 2, 2024, nearly 30% of China's regions are still not making as much

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progress as expected. As a result, the lowered requirements were published: By the end of 2025, the DRG/DIP payment method will cover all eligible medical institutions providing inpatient services [3].

3. Analysis on the Problem

3.1. Similarities Between the DRGs Reforms in the U.S. and China

3.1.1. Payment Model Transformation: From Fee-for-Service (FFS)

The DRGs reforms in the United States and China reflect a significant shift in payment models from the traditional Fee-for-Service (FFS) to Diagnosis-Related Groups (DRGs). This change is because the conventional FFS health insurance model, after being popularised, has caused many problems in both countries, such as hospitals providing unnecessary medical services to increase revenue.

3.1.2. The Goal of Total Cost Control

One of the common goals of the DRGs reforms in the United States and China is to control total healthcare costs. Rapidly rising healthcare costs put considerable pressure on the healthcare systems of both countries. For example, in the United States in 1965, healthcare spending accounted for only about 5% of GDP. By the early 1980s, healthcare spending in the U.S. had almost doubled to about 9% of its GDP. In China, from 2016 to 2018, total health expenditure increased from around 4.6 trillion yuan to around 5.8 trillion yuan, with an average annual growth rate of 20.1%, which is far exceeding China's GDP growth rate over the same period. Both countries hope that fixing payment amounts according to disease type will encourage hospitals to control treatment costs and avoid over-treatment [4-8].

3.1.3. Quality Control Mechanisms

The U.S. and Chinese DRGs reforms emphasise the importance of guiding hospitals to improve medical service quality and patient treatment outcomes. For example, in the U.S., the Pay-for-Performance (P4P) mechanism directly links payment to hospitals' quality performance. Hospitals that meet high-quality standards and provide qualified patient care will receive more Medicare compensation. China's DRGs reform is also gradually encouraging hospitals to pay more attention to the long-term health of patients and post-discharge follow-up management. Some pilot areas have steadily begun to monitor readmission rates and link them to medical insurance payments as a means of quality control.

3.2. Differences Between the Chinese and The U.S. DRGs Reforms

3.2.1. Environment For Policy Implementation

The U.S. healthcare market is highly marketised, and the payment mechanism is more complex. For example, Medicare, the largest public healthcare insurance programme in the U.S. and managed by the federal government, covers seniors aged 65 and above and some people with disabilities. However, the vast majority of young and working people usually rely on private insurance, which is highly fragmented. In 2021, there are about 1,800 commercial insurance companies operating in the United States. They usually adjust the DRGs system according to their own strategic needs or combine it with other payment models. For example, the Health Maintenance Organization model provides comprehensive services to patients through a contracted network of medical providers and strictly controls patient choice. Therefore, the U.S. hospitals must not only consider the cost of treatment but also meet the insurance requirements of patients when applying the DRG payment model [9-13].

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China's social medical insurance system provides two options: Basic Medical Insurance for Urban Workers and Basic Medical Insurance for Urban and Rural Residents. By the end of 2021, the number of people participating in China's social medical insurance reached 1.36 billion, with a coverage rate of over 95% total population. However, China needs to find solutions to the increasingly important DRGs payment reform amidst many practical difficulties. First, China's Basic Medical Insurance for Urban and Rural Residents has relatively limited payment capabilities. For instance, the annual per capita funding standard for urban and rural residents' medical insurance in Guangdong Province is less than half of that for employee medical insurance, resulting in relatively high out-of-pocket expenses for urban and rural residents in the event of serious illness or long-term hospitalization. In addition, China has entered an ageing society, with the proportion of the population over 65 years old reaching 14.9% in 2022 and keeping growing. Areas with serious ageing population problems are troubled by their current income that cannot cover expenses, such as Liaoning Province in 2019. At the same time, the level of medical services and hospital management in China varies significantly among different regions. Tertiary hospitals in large metropolis such as Beijing and Shanghai can quickly adapt to the DRGs payment reform through their advanced information systems and efficient management processes. However, county-level hospitals in other regions have encountered difficulties such as delays in updating the hospital's management information system and insufficient data processing capabilities [14].

3.2.2. Government and Market Roles

The DRGs reform in the United States relies more on the impetus of market forces. After introducing DRGs payment in Medicare, commercial insurance companies also began to draw on this model and adjust it to their own needs. So, the U.S. government provides a framework and guidance at the policy level, while market competition drives hospitals and insurance companies to find best practices for reforming payment models.

China's DRGs reform is government-led, with policy formulation and implementation highly dependent on government promotion. The National Healthcare Security Administration of China is responsible for formulating policies and promoting pilots. And the Chinese government also plays a central role in revising the DRGs payment standards and supervision.

3.2.3. Technology and Data Basis

The Medicare Claims Processing System of the CMS (The Centers for Medicare & Medicaid Services) collects diagnosis, treatment process and cost data from all healthcare providers participating in the Medicare programme and uses these data to accurately calculate the DRGs payment levels. Other systems like HCUP, managed by AHRQ (The Agency for Healthcare Research and Quality), integrate hospital inpatient data such as admission rates, disease group classifications and treatment outcomes across the United States. It acts as a good support for the classification of DRGs and provides a rich source of data for policymakers and commercial insurers. Moreover, the data analysis capabilities of commercial insurance companies in the United States are also excellent. For example, UnitedHealth Group can collect and analyse patient data from various medical institutions in real time through its subsidiary Optum's data platform, which ensures the accuracy of the DRGs system.

In contrast, China faces the problem of a relatively weak data foundation in its DRGs reform. First, the unified national medical data management system is still under construction. As a result, medical data may not be updated in real-time and transmitted on time across regions. For example, though the DRGs pilot projects in Shanghai and Jiangsu province have achieved remarkable results, these experiences are hard to directly replicate in regions with relatively weak information foundations, like the central and western areas. Furthermore, some county-level hospitals in the Guangxi Zhuang

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Autonomous Region still largely rely on manual methods to collect medical data, leading to slower reimbursement of hospital medical expenses and even affecting the rational allocation and use of medical insurance funds.

3.3. Innovative Measures

3.3.1. Innovation in the U.S.

Notable DRGs innovations in the United States include the VBP (Value-Based Healthcare Payment Model) implemented since 2010 through the Patient Protection and Affordable Care Act. The core of VBP is to link payment to healthcare quality and patient outcomes rather than just the volume of healthcare services. Under the VBP model, some hospitals can receive additional Medicare reimbursements by improving the quality and satisfaction of patient care. Hospitals that fail to meet the expected standards, especially those that perform poorly in terms of readmission rates, complication management, etc., will have their payments cut.

In addition, Medicare in the United States introduced the HRRP (Hospital Readmission Reduction Programmed) in 2012. This programmed aims to reduce inefficient and unnecessary hospital stays by stipulating that hospitals should keep their readmission rates within a certain range for certain specific diseases, such as heart failure, heart attack and pneumonia. If a hospital's readmission rate exceeds the predetermined standard, Medicare will reduce the payment to the hospital.

3.3.2. China's Innovations

China promotes a hierarchical diagnosis and treatment system in the DRGs payment reform to alleviate the pressure on large hospitals and improve the utilization rate of primary medical institutions. For example, hospitals in Shenzhen clearly divide the services of primary diagnosis and treatment, secondary hospitals and tertiary hospitals, and set different payment standards for hospitals of different levels in the DRGs payment model, encouraging patients to receive initial diagnosis and treatment at primary medical institutions and be transferred to large hospitals according to the actual condition.

Furthermore, China has innovated a new disease-based scoring system that does not rely entirely on fixed groups called DIP (Diagnosis-Intervention Packet). The DIP payment standard is based on a comprehensive score of multiple dimensions, such as the patient's diagnosis, treatment intervention, length of stay, surgical operations, and medical resource consumption. The amount of medical insurance reimbursement is based on the final score. DIP is particularly suitable for complex, personalized cases or medical scenarios with more diverse types of hospitalization. It hopes to improve the flexibility of hospital payments between different treatment methods for complex diseases in different medical scenarios.

3.4. Chanllenges

3.4.1. Updating Databases and Adopting New Technologies

Although the United States is a leader in information technology and data processing, it still requires significant funding to cope with the ever-changing needs of medical technology and data management. As the use of precision medicine and genomics increases, healthcare services become more complex, and the amount and type of data generated also increases significantly. These technologies have created new challenges for the traditional DRGs payment system. For example, the cost and complexity of personalised treatments may not match the fixed payment standards in the traditional DRGs system. To cope with this change, hospitals and insurance companies in the United States may

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need to invest in more complex data analysis systems to support precision medicine-based treatments. In addition, more and more hospitals and insurance companies are also beginning to use AI (artificial intelligence) and ML (machine learning) to process medical data. However, the application of AI technology also requires continuous training of AI algorithms, expansion of data storage, and integration with existing payment systems.

China, on the other hand, faces data management issues. Significant financial investment, human and technical support, and time are still required from the central and local governments if they are to unify data standards for the healthcare information platform, address the poor informatization equipment in county hospitals and primary care facilities, and solve the problem of medical data sharing and interconnectivity in the central and western regions. Apparently, China's realization of a unified DRGs payment system is based on updating databases and using new technologies. However, the delivery of a national healthcare information platform is still on the way.

3.4.2. Stakeholder Reactions

Revenue Adjustment Difficulties in Large U.S. Teaching Hospitals:Large teaching hospitals often involve complex treatment processes and rely on a wide range of service offerings to support research and teaching activities. The standardisation of the DRGs payment model may pose a challenge to such medical institutions. For example, teaching hospitals have to reduce the length of hospital stays and streamline treatment processes, which may affect the revenue prepared for teaching and research projects, restraining the hospital's long-term investment in scientific research and the provision of high-end treatment services.

The Combination of The U.S. Commercial Insurance Market and The DRGs System: The bargaining power of commercial insurance companies and healthcare providers, leading to some inconveniences in hospitals that cannot be ignored when applying the DRGs model. For instance, large insurance companies such as UnitedHealth Group have used the DRGs system to limit the cost growth of hospitals during treatment, further squeezing their profit margins and forcing them to deal with the dual pressure of the government and insurance companies.

How China Balances the Interests of Hospitals and The Work Burden of Doctors: The DRGs payment reform aims to control the use of medical resources and reduce unnecessary waste from examinations and treatments, but it has currently resulted in a reduction in income for hospitals and doctors. For example, after the introduction of DRGs payment in some public hospitals in Guangzhou, some doctors reported that their bonuses and performance allocations had decreased due to reduced resource consumption, which affected their work enthusiasm.

3.4.3. Policy and Regulation

Policy Uncertainty in the U.S. Impacts long-term Hospital Planning: The regularly discussions and potential policy changes of the U.S. Congress may create uncertainty for hospitals in their long-term planning. For example, in 2019, Congress proposed possible payment cuts and ways to reclassify DRGs disease groups. Although these proposals were ultimately not passed, hospital administrators remain concerned about the possibility of significant future policy changes, particularly in the areas of budgeting and resource allocation. Long-term uncertainty will undoubtedly affect hospital investment decisions.

Uneven Regulation in the United States May Lead to Abuse of the Payment System: Under the DRGs payment model, some hospitals have taken advantage of regulatory loopholes to engage in abuse and fraud, resulting in a waste of medical insurance funds. Like some medical institutions in Florida were found to have inflated patient conditions, repeated declarations, or unnecessary hospitalizations in order to increase Medicare payments. Although the federal government has

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strengthened its supervision of the DRG payment system, due to uneven supervision, many hospitals are still able to take advantage of policy changes to engage in misconduct.

Challenges in Implementing Policies in China: The top-down management model of China's healthcare system often requires the approval and feedback from multiple levels. Therefore, when implementing the DRGs payment reform, ocal governments may need more time to respond to policies, especially in less economically developed areas.

Lack of Regulation May Result in Hospitals' Selecting Diseases For Treatment in China: Due to the lack of a sound regulatory mechanism, some hospitals in Hangzhou were found to accept patients with relatively mild conditions and less complicated treatments in order to increase revenue while referring complex patients to other hospitals, which will result in the irrational and unfair use of medical insurance resources.

Policy Coordination Between Local and Central Governments in China: The top-down management model of China's healthcare system often requires approval and feedback from multiple levels. This may delay the reform process when hospitals spot conflicts between the local medical insurance bureau and the central policy standards. Because the local governments may need more time to respond to new policy updates, especially in less economically developed areas.

4. Suggestion

4.1. Strengthen the Exchange of Experiences in the DRGs Reform

The U.S. and China jointly hosted a healthcare insurance exchange meeting in Beijing in 2017; the summit served as a platform for government officials and hospital managers to conduct case studies and discussions. In addition, Harvard Medical School and Tsinghua University jointly hosted an international symposium on DRGs reform in 2018, focusing on sharing healthcare reform experiences. It is recommended that such reform summits and exchange activities be held regularly to discuss how to optimise the DRGs payment system. Then, Chinese healthcare administrators will have the opportunity to gain empirical experience of the success of the United States. Researchers and experts from the U.S. will also gain a better understanding of the Chinese healthcare system.

4.2. Improve Technical Support and Data Systems

4.2.1. China Could Promote the Standardisation

The experience of the United States shows that a more mature electronic health record (EHR) system, a standardised medical data platform and an electronic medical record system can effectively improve the transparency and accuracy of the payment model. For China, in order to ensure that the DRGs payment system operate smoothly across different hospitals and regions, the Chinese government needs to further promote the standardisation of medical information systems. Therefore, it is recommended that China draw on the experience of the United States to accelerate the construction of a nationwide medical data platform, unify medical data standards, and ensure that hospitals at all levels can be connected through information systems to achieve data interconnection and reduce technical barriers for hospitals in the data upload and reimbursement processes as soon as possible.

4.2.2. The U.S. Could Upgrade of Information Systems to Adapt to New Technologies

As U.S. medical institutions like the Mayo Clinic gradually discovered that precision medicine based on genomic data and individual differences is difficult to fully integrate with the traditional DRG payment system. It proves the U.S. needs to continuously update information systems to ensure that the DRGs payment model can adapt to the complexity of modern healthcare services. Therefore, it is

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recommended to further introduce precision medicine and genetic data-based disease groups on the existing data management system, and use artificial intelligence technology to help medical institutions and health insurance departments monitor the use of medical resources in real-time, detect abnormal data in medical services in a timely manner, and adjust payment standards on an individual basis, effectively preventing medical institutions from circumventing the requirements of the DRG payment model by selecting patients, misreporting conditions, and prolonging hospital stays.

4.3. Promote the Active Participation of Stakeholders

4.3.1. China's Medical Institutions Could Adjust the Benefit Distribution Mechanism

In China, many doctors in small and medium-sized hospitals and primary care institutions face a reduction in income due to the DRGs payment model, which is likely to affect the regular operation of hospitals and doctors' work enthusiasm. The United States has already addressed these issues by establishing incentives linked to the quality of medical services. For example, the VBP (Hospital Value-Based Purchasing) plan to link hospital payments to the quality of medical services and patient outcomes and determines payment amounts based on index like patient experience and satisfaction, the effectiveness and efficiency of medical processes, etc. Therefore, China can learn from the U.S. experience to ensure the normal operation of hospitals and the work enthusiasm of doctors.

4.3.2. U.S. Insurers can Provide Patient Education and Incentives as Preventive Measures

U.S. policymakers should avoid cutting back on patient care or lowering the quality of care due to insurance cost pressures. Therefore, patient education and incentives for preventive measures are a viable approach. Insurers can help patients better understand their health status and reduce long-term medical expenses through health management programs such as personalized schemes for high-risk patients' diet, exercise medication management, etc., to reduce the need for hospitalization or treatment. Furthermore, preventive care incentives such as gym subsidies, health rewards, etc., also help patients improve their health and avoid serious illnesses, reducing long-term medical costs.

4.4. Continuous Monitoring and Evaluation

4.4.1. China Could Regularly Evaluate the DRGs Payment Reform and Make Relevant Data Public

Regularly collecting and analysing the DRGs payment data from different regions and hospitals across the country, like every six months or every quarter, could help administrators assess the effectiveness of the reform in a timely manner. Then, payment standards for diseases with too low a reimbursement amount can be quickly adjusted upwards, and vice versa. At the same time, the Chinese government could introduce third-party institutions to participate in the evaluation of the DRG reform, for instance, by commissioning well-known medical policy research institutions, universities or professional evaluation companies to ensure the objectivity and impartiality of the results.

4.4.2. The U.S. Could Strengthen the Supervision of the DRGs Payment System

Although the CMS (The Centers for Medicare & Medicaid Services) already uses audits and inspections to control fraud and abuse, traditional auditing methods are often lagging and difficult to identify problems in real-time. Therefore, the CMS may use big data and AI technology to ensure the rational use of medical insurance funds. First, analyzing the DRGs payment data from different hospitals can identify deviations between a particular hospital and the industry average and quickly

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detect overdiagnosis or unusually high reimbursement rates for certain diseases. Then, the abnormal data can be investigated in depth. Second, if artificial intelligence technology is used, the CMS can automatically screen out data that does not meet the regulations when hospitals submitting the DRGs reimbursement amount, improving the overall efficiency and accuracy of reporting. Finally, the CMS can also use big data technology to create predictive models that can tell in advance which hospitals or doctors are likely to engage in abusive practices by modelling historical data such as historical performance, characteristics of patient groups, and complexity of treatment plans.

5. Conclusion

First, the DRGs payment model reforms in China and the United States both reflect a major shift from the traditional Fee-for-Service (FFS) to Diagnosis-Related Groups (DRGs) payment method. The main motivation for this shift is the problems with the FFS model in the healthcare systems of both countries, such as rapidly rising medical costs and over-treatment. Through the DRGs payment model, both countries are attempting to control total medical costs and promote the rational allocation of medical resources. Although the two countries started from different positions and took different paths, they both share the consensus that DRGs payment can improve the healthcare system.

Secondly, in terms of quality control, both countries' DRGs reforms emphasise the use of payment mechanisms to guide hospitals in improving the quality of healthcare services. In the U.S., the "Pay-for-Performance" (P4P) mechanism directly links payment to the quality of hospital services, encouraging hospitals to pay more attention to medical outcomes and patient satisfaction. China has gradually introduced similar quality control measures in its DRGs reform, and some pilot regions have linked readmission rates to payments to encourage hospitals to improve the quality of long-term care.

However, there are significant differences between the two countries in the implementation environment for DRGs payment reform. The U.S. healthcare market is highly commercialised, and the DRGs payment model needs to operate in a complex and diverse commercial insurance market, facing multiple games from different insurance companies and stakeholders. In contrast, China's healthcare system is government-led and has broad coverage but relatively limited payment capacity. The DRGs payment reform faces challenges of funding pressure and regional differences, especially in the operation of urban and rural residents' medical insurance and primary care institutions.

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