Discussion on the development and guarantee measures of human resources in hospitals in knowledge economy era

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Abstract. In the knowledge economy era, structural contradictions and development bottlenecks in hospital human resource management have become increasingly prominent. Data analysis reveals that current hospitals suffer from deficiencies in talent planning, incentive mechanisms, and digital management. In line with industry trends and policy guidance, a "dynamic planning — digital empowerment — precise incentives" system is proposed to address these bottlenecks. The effectiveness of this system is validated through specific case studies, which show that optimizing human resource allocation, enhancing technology application, and innovating incentive models can significantly improve a hospital's core competitiveness and service quality.

Keywords: Knowledge Economy; Hospital Human Resources; Development Guarantee.

1. Introduction

In the knowledge economy era, the foundation of hospital development lies in the rationality of human resource structure. According to the 2024 China Health Statistics Yearbook, the nurse-to-doctor ratio in tertiary hospitals is 1:1.8, far below the international standard of 1:2.5. In rural health centers, less than 35% of staff have a bachelor's degree or higher, while this proportion is 78% in urban hospitals. See Table 1 for specific data. This disparity directly leads to an imbalance in medical service capabilities. For example, urban hospitals have ample talent reserves when dealing with complex cases, whereas primary healthcare institutions struggle to cope with common diseases due to a shortage of personnel.

2. Analysis of the current situation of human resource management in hospitals in knowledge economy era

2.1 Imbalance of human resource structure

Developed regions concentrate highly educated talents, while the annual talent turnover rate in primary healthcare institutions reaches as high as 15%[1]. The construction of primary healthcare in terms of stability and quality assurance is becoming increasingly difficult to maintain. There is a significant gap among academic leaders, with only 22% of chief physicians being under 45 years old. In the long term, this could lead to a generational gap in technical inheritance and innovation within hospital disciplines, affecting the structural development and continuous technological innovation of medical specialties.

Table 1. Comparison of key human resource indicators in different levels of medical institutions

Metric	Tertiary hospitals	Secondary hospital	Health clinics in towns and townships
Medical ratio	1:1.8	1:1.5	1:1.2
The proportion of those with a bachelor's degree or above	78%	62%	35%
The proportion of senior professional titles	28%	19%	8%

2.2 Lagging management mechanism

83% of hospitals still rely on manual attendance and paper records for management. This traditional model falls short in efficiency and is prone to human error[2]. Performance evaluations depend on subjective scoring, lacking specific quantitative indicators, which makes it difficult for assessment results to truly reflect employees' actual work performance. The rigidity of systems is also quite evident; the lifelong tenure system for professional title promotions leads to a situation where people can only move up but not down. According to survey results from a top-tier hospital, 32% of senior professionals aged 55 and above have an actual workload below average, undoubtedly suppressing the efficiency of medical resource utilization and significantly reducing the motivation of young healthcare workers.

2.3 The incentive system is not perfect

In public hospitals, 76% of institutions have a fixed salary component exceeding 80%, with performance-related parts accounting for only 15-20%[3]. This single form of compensation is difficult to boost healthcare workers' professional enthusiasm. The career advancement path for grassroots medical staff is narrow; only 21% of township health centers offer interdisciplinary training opportunities, limiting their career development space. Under such restricted conditions, healthcare workers in township health centers not only lack motivation to improve their skills and service quality but also face the limitation of an "advancement ceiling." The narrow promotion channels and limited training opportunities restrict their professional development and skill enhancement, making it difficult for grassroots medical staff to find pathways for career development and improvement.

3. Challenges faced by hospital human resource management

3.1 Intensified competition for talents

After the comprehensive opening of the medical market, private hospitals have posed a strong challenge to public hospital talent with their flexible compensation mechanisms and equity incentive plans[4]. In 2023, the inflow rate of talent from private hospitals in a provincial capital city increased by 47% year-on-year, including key doctors and nurses from public hospitals. Private hospitals lure employees with high salaries; some department heads earn 30-50% more annually than those at public hospitals and are provided with equity incentives to enhance employee loyalty and sense of belonging, as shown in Table 2.

Table 2. Talent inflow of private hospitals in a provincial capital city in 2023

Type of talent	Inflow numbers	Year-on-year growth	Main source
Doctor	320	52%	Governmental hospital
Nurse	480	43%	Governmental hospital
Administrative staff	80	38%	Governmental hospital

The proportion of non-regular staff in public hospitals is increasing, and the management problems are becoming more prominent. In some hospitals, the proportion of non-regular staff exceeds 40%, and the phenomenon of different pay for the same work is particularly prominent. The salary of non-regular staff only reaches 60%-70% of that of regular staff, and the satisfaction rate drops by 23%, while the turnover rate increases by 17%, which seriously affects the stability of human resources in hospitals.

4. Hospital human resource development guarantee system

4.1 Build a dynamic talent planning system

In the knowledge - economy era, the hospital medical environment is changing profoundly[5]. The volatile medical market demand challenges hospitals' coping abilities, so hospital talent

planning needs to be forward - looking and flexible.Scientific tools like regression analysis and Markov Chain are used to build a “technology development coefficient of the degree of regional population aging” three - dimensional prediction model. It requires in - depth analysis of the past five - year regional population aging data, hospital treatment volume changes, and an accurate understanding of medical technology trends. For example, in a highly aged region, the model predicts a 25% increase in physician demand and a 40% increase in rehabilitation therapist demand in the next three years, supporting hospitals' pre - arranged talent reserves.Hospitals should innovate in talent allocation with a “core talent pool + flexible flow pool” mechanism. The core talent pool, composed of disciplinary leaders and backbones, guides the development of disciplines and handles complex diseases. The flexible flow pool consists of multidisciplinary healthcare workers who can flexibly adjust their work according to department needs.

4.2 Improve the digital management platform

In the digital wave, the medical industry is leveraging advanced technology to enhance operational management. In hospital human - resource management, the AI recruitment system is a major innovation.The AI recruitment system shortens the recruitment cycle[6]. Previously, it took 20 days on average to fill a position, causing the hospital to miss top talents and applicants to wait long. Now, it's reduced to 7 days, boosting recruitment timeliness and competitiveness.The hospital built an online learning platform with a “credit bank” system. Before, training coverage was only 42% with low staff participation. Now, it has soared to 91%. Medical staff can choose personalized courses, increasing their annual training time by 20 hours and training satisfaction by 38%.The hospital implemented the performance Kanban system for real - time data monitoring. Previously, performance assessment objectivity was questioned due to data collection and analysis issues. Now, the objectivity has increased by 35%. The system collects and analyzes multi - dimensional data (medical quality, service attitude, scientific research results), helping detect medical risks, improve patient experience, and support scientific research strategies. All benefits are shown in Table 4 for hospital management.

5. Case analysis

5.1 Implementation Background

A provincial hospital, serving as a regional medical center, bears the heavy responsibility of providing medical care. The original human resource management has prominent issues that severely constrain its development. The turnover rate of mid-career talents under 35 years old is as high as 12%, with many opting for hospitals offering better benefits and greater career prospects. Some departments suffer from severe talent shortages, affecting the normal operation of medical services. Performance evaluations are primarily based on subjective impressions, lacking quantifiable metrics, making it difficult to accurately reflect employee performance and serve as an effective incentive. In employee satisfaction surveys, the total score was only 61 out of 100, with significant dissatisfaction in areas such as compensation and career development. Employee satisfaction scores for these aspects also indicate a lack of contentment.

5.2 Measures and results

To address the aforementioned issues, the hospital has implemented human resource development measures, establishing a regional population health database to integrate data on the local population, disease profiles, and healthcare service utilization. By leveraging big data analysis and predictive models, it forecasts talent demand over the next five years. In the coming five years, with an intensifying aging population, the demand for geriatric medicine specialists is expected to increase by 30%, while the demand for rehabilitation therapists is projected to rise by 45%.

Add the "Technology Innovation Award" to reward teams and individuals who have made outstanding contributions to the transformation of scientific research results and the application of new technologies. The maximum prize money reaches 500,000 yuan, and the performance-based salary ratio has increased to 40%, related to indicators such as medical quality, service attitude, and patient satisfaction. After implementation, the number of new technologies launched increased from 15 to 32, a rise of 113%; patient satisfaction improved from 72% to 86%. Specific comparisons before and after are shown in Table 5.

Table 5. Comparison of human resource development guarantee measures before and after implementation in a provincial hospital

Metric	Before implementation	After implementation	Amplitude of variation
Talent turnover	12%	5%	-58%
Staff satisfaction	61 points	83 points	+36%
Number of new technologies developed	15 items	32 items	+113%
Patient satisfaction	72%	86%	+19%

6. Conclusion

In the knowledge economy era, hospital human resource management faces both opport unities and challenges. This study analyzes structural imbalances, lagging mechanisms, and i ncomplete incentive systems in current hospital HR management. It proposes dynamic talent planning, the construction of digital management platforms, innovation in incentive and eva luation mechanisms, and enhanced support for career development as responses. An empirica l analysis from a provincial hospital shows that these measures have significantly improved the hospital's core competitiveness, employee satisfaction, and patient service quality. Specifi c analyses and related content are included in the study.

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