Medical-Social Collaboration and Community Smart Health Cabin: Reconstruction of Tiered Diagnosis and Treatment Pathways Postprint

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Abstract

Background: Since its implementation, the hierarchical diagnosis and treatment system has progressed slowly, with insufficient comprehensiveness in analyzing multiple stakeholders being one of the important reasons.

Objective: By analyzing the interest relationships among multiple stakeholders in the hierarchical diagnosis and treatment system, this study explores mechanism innovation solutions that integrate both top-down and bottom-up pathways. Through policy innovation and path innovation, it aims to facilitate collaborative governance among multiple stakeholders and optimize the graded diversion medical treatment order.

Methods: From October 10, 2022 to March 20, 2023, two advanced districts in developed cities in China (District S of City X and District H of City N) were selected as typical research areas. Through snowball sampling and purposive sampling, 36 different stakeholders (covering seven types of actors: municipal health administrative departments, tertiary hospital managers, tertiary hospital specialists, community health service center managers, general practitioners, health social workers, and patients) were selected as research subjects for in-depth interviews. Using stakeholder theoretical analysis methods, the study analyzed interest entanglements and constraints among the seven major actors and their restrictions on the healthy development of the hierarchical diagnosis and treatment system's medical order, to explore the mechanism dilemmas of the system. Additionally, text analysis was conducted on interview records of typical stakeholders from pilot and non-pilot areas implementing health social work and community smart health cabins in District S of City X and District H of City N, to compare effects before and after implementation.

Results: In-depth interview results revealed that four major dimensions—"degree of stakeholder relevance, implementation willingness, degree of being

affected by implementation, and influence on implementation"—are the primary aspects affecting the seven types of actors in implementing the hierarchical diagnosis and treatment system. The seven major actors each hold their own interest positions, exerting varying degrees of facilitating and hindering effects on the system. The key problem lies in the difficulty of forming a collaborative mechanism among multiple stakeholders. The pilot areas' promotion of community smart health cabins, health social work, and the resulting new medical-social collaboration mechanism helps enhance stakeholder relevance among the seven major actors and achieve a better hierarchical diagnosis and treatment order.

Conclusion: The community smart health cabin serves as the materialized space for the new medical-social collaboration mechanism, while health social workers act as the linking points and enablers of this mechanism. By leveraging the new carrier of community smart health cabins and the new force of health social workers, constructing a new medical-social collaboration path centered on health social work can realize the grassroots pre-positioning of medical access points, playing an "enabling and guiding" role in forming the hierarchical diagnosis and treatment order.

Full Text

Medical and Social Cooperation and Community Smart Health Huts: Reconstruction of Hierarchical Diagnosis and Treatment Path

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Abstract

Background: One important reason for the slow progress of hierarchical diagnosis and treatment since its implementation is the insufficient comprehensiveness in analyzing multiple subjects and stakeholders. **Objective:** By analyzing the interest relationships among diverse stakeholders in hierarchical medical diagnosis and treatment, this study explores mechanism innovation solutions that integrate both top-down and bottom-up approaches. Through policy and path innovation, the aim is to facilitate collaborative governance among multiple stakeholders and optimize the hierarchical patient flow system. **Methods:**

From October 10, 2022, to March 20, 2023, two advanced urban districts in China (S District in X City and H District in N City) were selected as typical research areas. Using snowball and purposive sampling, 36 stakeholders across seven categories were selected for in-depth interviews, including municipal health administrative departments, tertiary hospital administrators, tertiary hospital specialists, community health service center administrators, general practitioners, health social workers, and patients. Stakeholder theory analysis was employed to examine the conflicts of interest and constraints among these seven major groups and their impact on the healthy development of hierarchical diagnosis and treatment order, thereby exploring the mechanism dilemmas. Additionally, textual analysis of interview records from typical stakeholders in pilot and non-pilot areas implementing health social work and community smart health huts in S District and H District was conducted to compare effects before and after implementation. **Results:** Interview results revealed that four dimensions—degree of interest, willingness to implement, extent of impact by implementation, and influence on implementation—are the main factors affecting stakeholder engagement in hierarchical diagnosis and treatment. The seven stakeholder groups hold distinct positions and exert varying degrees of facilitating or hindering effects. The key problem lies in the difficulty of forming collaborative mechanisms among diverse stakeholders. In pilot areas, implementing community smart health huts and health social workers, along with the resulting medical-social collaboration mechanism, helped enhance stakeholder relevance and improve hierarchical diagnosis and treatment order. **Conclusion:** Community smart health huts serve as the physical space for the new medical-social collaboration mechanism, while health social workers act as connectors and enablers. Through this new carrier and workforce, constructing a health social work-centered medical-social collaboration path can realize grassroots prepositioning of medical entry points, playing an "energy enhancement and flow guidance" role in establishing hierarchical diagnosis and treatment order.

Keywords: Health governance; Hierarchical diagnosis; Medical and social cooperation; Community smart health huts; Health social work

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The 20th Party Congress report emphasizes that building a Healthy China requires prioritizing people's health in development strategy. With the establishment of the Central Social Work Department, social work has been entrusted with social governance responsibilities. Applied to health, this means evolving from "health management" to "health governance." As a crucial lever for medical system reform, China's hierarchical diagnosis and treatment system, implemented since January 2015, has optimized medical resource allocation to some extent [1]. However, obvious problems remain: low public compliance with "grassroots first contact," imperfect "two-way referral" mechanisms causing patients to "go up but not down," inadequate "acute-chronic separation" where "acute cases can't enter and chronic cases can't transfer out," and misaligned "vertical linkage" management systems [2].

Literature review reveals limited academic exploration of hierarchical diagnosis from perspectives of patient health needs or multidisciplinary integration. Discussions from patient and practitioner viewpoints remain superficial, and research on chronic disease hierarchical diagnosis is still in its infancy [3]. Problems and causes can be analyzed at macro and micro levels. At the micro level, patients distrust grassroots healthcare and show low compliance with grassroots first contact. At the macro level, since public medical institutions allocate resources by administrative rank and operate under market-oriented healthcare services, over 80% of quality medical resources concentrate in large cities' tertiary hospitals. Tertiary hospitals compete with grassroots institutions for patients, creating a "siphoning effect" on both medical talent and patients, which further weakens grassroots institutions and exacerbates disorder in hierarchical diagnosis [4].

The ideal state of hierarchical diagnosis depends on whether reasonable interest distribution and incentive mechanisms exist among multiple stakeholders [5]. Most existing literature adopts a top-down medical management perspective, with few studies analyzing health governance from bottom-up viewpoints, lacking perspectives from patients and grassroots practitioners [6], and showing insufficient comprehensiveness in analyzing multiple stakeholders [7]. In recent years, community smart health huts have flourished as a new carrier, enabling residents to access convenient smart medical services in their communities. This study employs stakeholder theory to explore constructing a new hierarchical diagnosis path centered on health social work through mechanism innovation among multiple stakeholders and carrier innovation via community smart health huts.

1. Research Subjects

This study selected advanced districts in cities with well-established hierarchical diagnosis systems as typical research areas. The field survey chose X City and N City, both national pilot cities for public hospital reform and advanced in basic public health services. These cities have guided quality medical resources to grassroots levels with remarkable results. Through consultation with health administrative departments, S District in X City and H District in N City were finalized as typical research areas. Both districts have mature tertiary hospitals and multiple community health service centers serving residents with diverse medical needs. Some streets in these districts have piloted health social workers and community smart health huts with positive results, enabling comparative analysis between pilot and non-pilot areas.

Using snowball and purposive sampling, 36 stakeholders across seven categories were selected as interview subjects, covering municipal health administrative departments, tertiary hospital administrators, tertiary hospital specialists, community health service center administrators, general practitioners, health social workers, and patients to explore mechanism dilemmas in hierarchical diagnosis. presents the basic information of interviewees.

2. Data Collection

Interview themes for the seven stakeholder groups focused on two major aspects: (1) Each group's interest positions, implementation willingness, degree of impact, and policy influence regarding hierarchical diagnosis; and (2) How to design division-of-labor and coordination mechanisms among multiple stakeholders, including institutional constraints and incentive mechanisms. The research team conducted 25-40 minute in-depth interviews with 36 participants, recording them with consent and transcribing them into text archives while coding respondents and documents. Researchers documented attitudes and tone objectively without guiding respondents. Textual analysis compared interview records from typical stakeholders in pilot versus non-pilot areas implementing health social work and community smart health huts in S District and H District.

3. Results

3.1 Basic Information of Interviewees Through literature analysis and preliminary research, seven major stakeholder categories were identified in hierarchical diagnosis reform. Interview subjects are shown in (respondents are represented by letter codes to protect privacy). For stakeholder categories C-G, equal samples were set in both pilot and non-pilot areas of the two research districts.

3.2 Analysis of Multiple Stakeholders in Hierarchical Diagnosis From a stakeholder theory perspective, the seven groups hold distinct interest positions and exert varying facilitating or hindering effects on hierarchical diagnosis [8]. Textual analysis revealed that four dimensions primarily affect stakeholder implementation: "degree of interest relevance," "implementation willingness," "degree of impact by implementation," and "influence on implementation." "Degree of interest relevance" refers to actual impact of hierarchical diagnosis on the stakeholder; "implementation willingness" indicates subjective motivation; "degree of impact by implementation" measures post-implementation effects; and "influence on implementation" assesses the stakeholder's power to affect the policy.

Health administrative departments and grassroots medical institution administrators and staff most desire hierarchical diagnosis and are the most active promoters. However, grassroots institutions have very limited policy influence. While health administrative departments have policy intentions, they lack cooperation from other stakeholders, resulting in poor policy effectiveness. Tertiary hospital administrators and medical staff show low willingness to promote hierarchical diagnosis and may become major obstacles. Patients are the ultimate beneficiaries but have the weakest implementation influence. presents the four-dimensional analysis of the seven major stakeholders.

3.3 Mechanism Innovation in Hierarchical Diagnosis

3.3.1 Urgent Need for Mechanism Innovation The breakthrough for new mechanisms lies in improving accessibility of quality medical services, increasing patient trust in grassroots hospitals, and reducing time costs in choosing medical institutions. However, patients still predominantly choose tertiary hospitals first. As one pilot area patient (G4) stated: "Going to community hospitals first is convenient, but there are few good doctors there. Worried about delaying treatment, I go directly to big hospitals. If I could see good doctors at community hospitals, why would I crowd into big hospitals?" Regarding two-way referral, downward transfer remains difficult. Grassroots medical staff (E1) noted: "Upward referral works smoothly, but downward referral is rare. Large hospitals still tend to compete for patients. Actually, when diseases are better controlled during later stages, returning to community rehabilitation would be better, but patients' mindsets haven't changed." In interest games, conflicts persist between tertiary and grassroots hospitals. One health department official (A1) explained: "Previously, large and grassroots hospitals engaged in zero-sum competition for patients, making hierarchical diagnosis difficult. Mechanism innovation is urgently needed to achieve positive-sum games, like 'playing bridge,' making everyone an interest community for complementary advantages and win-win cooperation."

3.3.2 Community Smart Health Huts In pilot areas of S District and H District, community smart health huts and health social workers have emerged. Standardized community smart health huts utilize digital media and internet technology to establish a "24-hour community remote video triage" system, providing residents with mobile "24-hour response" and "one-click call" professional triage services. Through smart medical technology, the huts enable remote joint clinics, multidisciplinary consultations, remote mobile consultations, and two-way referrals, offering professional, standardized, and feasible measures for community first contact.

When discussing the role of community smart health huts, patient G5 said: "Community smart health huts are very popular among residents. We can have health checks here and access good doctors through smart medical technology—it's both warm and convenient." Community health service center director D2 also affirmed: "This is an excellent platform and window that allows residents to access various quality medical resources." Health social worker F1 shared: "With community smart health huts, we health social workers have a frontline position to enter communities, making it easier to approach residents and become true health social workers." Health administrative official A2 explained: "Community smart health huts are both physical spaces and platforms coordinating major stakeholders. They have effectively promoted the reconstruction of hierarchical diagnosis paths and will play increasingly important roles with more smart medical technology support."

3.3.3 Health Social Workers Diverse and complex grassroots medical demands require multiple human resources. Grassroots medical institution admin-

istrator D1 stated: "General practitioners at community health service centers are overburdened and understaffed, making it difficult to penetrate residential communities. Therefore, to guide patients to grassroots first contact, new human resources are essential." Interviewees discussed the promoting role of health social workers in hierarchical diagnosis. X City health commission official A2 noted: "In X City, health social workers appear as health managers. They form a 'three-division co-management' team with specialists and general practitioners to jointly promote hierarchical diagnosis, achieving widespread social recognition and even appearing on CCTV's New Year Gala." N City H District general practitioner E3 shared: "Family doctors have signed up many residents, but limited staffing makes service delivery difficult. Health social workers partnering with us form a 'medical social work + family doctor' service model that effectively strengthens grassroots service capacity—a worthwhile development path."

Through comparative analysis of pilot and non-pilot areas, health social workers can play important roles [10]: (1) **Service coordinators**: Serving as physician assistants and service managers, they help patients address social and psychological problems caused by disease at individual, family, and social levels, improving efficiency for specialists and general practitioners. (2) **Resource linkers**: Leveraging community familiarity and policy knowledge to connect patients with social resources (including charitable resources). (3) **Health educators**: Increasing residents' health literacy and understanding of different institutions' functions in hierarchical diagnosis to guide patients to grassroots first contact.

3.4 Stakeholder Analysis in the New Mechanism Comparing pilot and non-pilot areas from a stakeholder perspective reveals increased relevance across all dimensions, as shown in . (1) For health administrative departments: effective realization of hierarchical diagnosis order and improved medical service efficiency. (2) For tertiary hospital administrators: alleviated overcrowding and reduced management difficulty. (3) For tertiary specialists: increased probability of encountering difficult and critical cases as mild common and chronic disease patients are diverted to community centers, enhancing medical efficiency and indirectly improving clinical skills. (4) For grassroots institution administrators: changed the "empty waiting room" situation and improved professional achievement. (5) For community general practitioners: enhanced capacity to treat common and chronic diseases and significantly increased income. (6) For health social workers: more guidance and training from specialists and general practitioners to improve professional capabilities. (7) For patients: access to more precise and accessible medical services, becoming the primary beneficiaries of hierarchical diagnosis.

4. Discussion

As the analysis shows, forming stakeholder communities is key to realizing hierarchical diagnosis. The crucial pathway is innovating supply mechanisms for

multi-stakeholder collaborative governance [11]. For years, China's administrative hierarchy between tertiary and grassroots hospitals has deteriorated hierarchical diagnosis order. Even with medical alliances and medical community administrative bundling, ideal patient flow hasn't formed [12]. Medical alliances and communities remain top-down administrative management concepts where leading hospitals hold absolute dominance, lacking both interest-driven motivation for downward referrals and endogenous incentives to support grassroots institutions [4]. The root cause remains difficulty in forming interest communities among different game players, requiring further mechanism design to create positive feedback loops promoting grassroots first contact and vertical referrals [13]. The most critical factor is that grassroots first contact is affected by patients' willingness, and current mechanisms lack a "diversion mechanism" at the demand front-end—a bottom-up grassroots first contact guidance mechanism.

4.1 Smart Health Huts: Grassroots Flow Guides for Hierarchical Diagnosis Domestic research has affirmed community smart health huts' positive role in chronic disease prevention and management [14-15]. Beyond chronic disease prevention, community smart health huts play more important roles in hierarchical diagnosis. Based on pilot practices in the two research districts, community smart health huts provide a new grassroots carrier for health governance and a pre-positioned medical entry mechanism—a frontline position for guiding "disease flow" that effectively enhances health service accessibility and enables "bottom-up" collaborative governance. Guided by health social workers, patients enter the hierarchical diagnosis path at community smart health huts through smart medical terminals. For difficult and severe cases, after "first contact" at the hut, the medical alliance's "green channel" assists patients in accessing tertiary hospitals, precisely matching experts and scheduling appointments to facilitate treatment plans [16]. Under this mechanism, community smart health huts become front-end "flow guides" for hierarchical diagnosis. Front-end diversion helps improve tertiary hospital efficiency, reduce waiting times, and lower medical costs. For elderly residents without companions and low-income disabled residents, community-organized volunteer escort services can be provided.

4.2 Medical-Social Cooperation: Collaborative Governance of Seven Stakeholders Given hierarchical diagnosis's multi-level nature and health service diversity, collaborative supply must achieve vertical interaction among multi-level subjects, horizontal cross-boundary collaboration among diverse subjects, and mutual embedding of multiple governance mechanisms. This embedding includes not only administrative and market mechanisms but also community mechanisms initiated by social actors—mutual embedding of administrative, market, and social mechanisms [11]. Particularly in grassroots services, social mechanisms with health social workers as human support and functional nodes are crucial. Community smart health huts facilitate collaboration among seven stakeholder groups: health administrative departments, tertiary hospital

administrators, specialists, grassroots institution administrators, general practitioners, health social workers, and patients. Unlike previous top-down administrative mechanisms, "medical-social cooperation" is a bottom-up mechanism design that includes both vertical and horizontal cross-boundary collaboration, as shown in [Figure 1: see original paper].

Specifically, under health administrative departments' promotion and supervision, hospital administrators coordinate planning, grassroots general practitioners handle daily outpatient services for common and frequent diseases, tertiary specialists manage severe and difficult cases, and health social workers provide social support systems through community smart health huts, offering health education and serving as key nodes for horizontal cross-boundary and interdepartmental collaboration. Specialists and general practitioners form professional cooperation, community general practitioners and health social workers form team collaboration, and hospital specialists and health social workers form professional support, jointly providing more effective guarantees for grassroots health governance. Patients actively participate as practitioners of hierarchical diagnosis. The perfect combination of community smart health huts and medical-social cooperation mechanisms ultimately achieves the goals of grassroots first contact, hierarchical treatment, vertical linkage, and acute-chronic separation.

5. Policy Innovation

Drawing from pilot experiences in the two research districts, achieving collaborative governance among seven stakeholder groups requires multi-pronged policy innovation. First, to incentivize tertiary specialists to serve in communities, health administrative departments should establish administrative assessment mechanisms for tertiary hospitals, strengthening administrative constraints on administrators to drive specialists to grassroots levels. Second, special subsidies should be provided for specialists' community services to ensure income stability. Third, grassroots institutions' enthusiasm for receiving first-contact patients should be incentivized by designating community health service centers as fully funded public institutions with uncapped performance wages, allowing full distribution of new grassroots first-contact medical income. Fourth, a health social work system should be established, including work concepts, standard systems, normative procedures, and human resource support. Fifth, health social workers' professional capacity should be enhanced through training and assessment organized by health administrative departments. Sixth, community first-contact incentives for residents should include not only higher medical insurance reimbursement rates but also, more importantly, using smart technology and professional human resources to promote precise matching of medical supply and demand, improving accessibility and precision to truly attract patients to grassroots "flow guides."

5.1 Constructing Standardized Community Smart Health Huts Innovating supply mechanisms for multi-stakeholder collaborative governance requires new implementation pathways. To establish effective "front-end diversion" mechanisms at the grassroots level, numerous community smart health huts must be built within residential communities. Leveraging smart medical technology for remote joint clinics, multidisciplinary consultations, remote mobile consultations, and two-way referrals provides professional, standardized, and feasible measures for community first contact, making the huts concrete carriers for new hierarchical diagnosis mechanisms [17-18]. As smart medical technology matures and popularizes, using internet-enabled wearable devices through huts enables efficient health data transmission, precise expert-patient matching, and whole-life-cycle health governance for community residents, breaking traditional spatiotemporal limitations of medical services, accelerating service delivery, and improving resource accessibility and allocation efficiency. This transforms smart health huts into new urban health public facilities [19-21]. Administratively, huts adopt a "vertical guidance, horizontal coordination" management approach: site selection and financial investment are undertaken by district governments and sub-district offices, while smart health and medical services are uniformly guided by health administrative departments. Sub-districts and communities actively support integration of public service resources to ensure health social workers can horizontally link resources. Combined with current priorities of "one elderly, one child" services, functional huts for "care/childcare" can be established within the community service system framework.

5.2 Promoting Medical-Social Cooperation and Health Social Work The new medical-social cooperation supply mechanism involves professional cooperation between specialists and general practitioners, team collaboration between community general practitioners and health social workers, and professional support between hospital specialists and health social workers. This mechanism can be piloted before broader promotion. To realize medical-social cooperation, a workforce must be cultivated as human support—health social workers are indispensable. Beyond platform operation and management, health social workers must function as resource linkers and enablers. Due to their professional concepts and methods, health social workers can maintain the "public welfare attribute" of health services under cooperative supply mechanisms and uphold "value neutrality" amid stakeholder conflicts, effectively guarding against public welfare deficits.

6. Conclusion

This study employed stakeholder theory to analyze seven stakeholder groups related to hierarchical diagnosis and constructed a new bottom-up hierarchical diagnosis path centered on "community smart health huts" as the concrete carrier and health social work as the main linking node. Through this new carrier and workforce, constructing a health social work-centered medical-social col-

laboration path can realize grassroots pre-positioning of medical entry points, playing an "energy enhancement and flow guidance" role in establishing hierarchical diagnosis order.

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Author Contributions

Wu Yuxia and Ma Hongbo: conceptualized research goals, designed the study, implemented research, wrote the manuscript, collected and organized data, and created tables and figures. Wu Yuxia takes overall responsibility for the article. Mi Hong: responsible for quality control and supervision.

Conflict of Interest Statement

The authors declare no conflict of interest.

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