# Implementation Status, Problem Analysis, and Policy Recommendations for Primary-Level Hypertension Management Models in China: A Health System Perspective Based on Semi-Structured Interviews (Postprint)

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## Abstract

Background Hypertension is the most common chronic non-communicable disease affecting the health of Chinese residents. Primary care serves as a critical gateway for hypertension management and control, and its management capacity directly influences management effectiveness. The current operational status and common patterns of primary care hypertension management models in China require further investigation. Objective To understand the current status of primary care hypertension management in China, summarize typical experiences, and provide recommendations for optimizing hypertension management. Methods From November to December 2021, semi-structured interviews were conducted with 29 stakeholders in hypertension management across five provinces and municipalities in China. Guided by the World Health Organization' s health systems framework, analysis was conducted across six dimensions: leadership and governance, service delivery, health workforce, health financing, access to medicines and equipment, and health information systems. Results At the leadership and governance level, primary care hypertension management primarily relies on family doctor contract services with multi-sectoral collaborative management. At the service delivery level, integrated general and specialized services are provided to meet patients' personalized medical needs. At the health workforce level, community general practitioners constitute the main force in primary care hypertension management, with performance-based pay-for-work mechanisms to improve work motivation. In health financing, hypertensive patients receive preferential policy support for medical insurance reimbursement at the primary care level. In terms of drug accessibility, basic medical equipment and essential hypertension medications are available at the primary care

level. Regarding health information systems, regional health information platforms enable health information sharing and service coordination for contracted patients. Conclusion Primary care institutions bear the responsibility for long-term follow-up management of hypertensive patients. Primary care hypertension management can be further enhanced by improving comprehensive primary care governance and service delivery capacity, strengthening primary care workforce capacity building, refining medical insurance reimbursement and payment system mechanisms, improving drug and equipment conditions for hypertension treatment at the primary care level, and effectively empowering primary care hypertension management through information technology development.

## Full Text

# The Current Status Analysis and Policy Recommendations of Hypertension Control and Management in Primary Health Care in China from the Perspective of Health System Based on Semi-structured Interviews

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### Abstract

**Background:** Hypertension is the most common chronic non-communicable disease affecting public health in China. As a critical gateway for hypertension management and control, the capacity of primary care directly influences management outcomes. However, the current operational status and common patterns of hypertension management models in China' s primary care settings require further investigation.

**Objective:** To examine the current status of hypertension management in primary care across China, identify exemplary practices, and provide evidence-based recommendations for optimizing hypertension management strategies.

**Methods:** Between November and December 2021, we conducted semi-structured interviews with 29 stakeholders involved in hypertension manage-

ment across five provinces and municipalities in China. Guided by the World Health Organization' s health system framework, we analyzed the qualitative data across six dimensions: leadership and governance, service delivery, health workforce, financing, access to essential medicines, and health information systems.

**Results:** At the leadership and governance level, primary hypertension management primarily relies on contracted family doctor services and multi-departmental collaboration. For service delivery, integrated general and specialty services are provided to meet patients' personalized medical needs. Regarding health workforce, community general practitioners serve as the main force in primary hypertension management, with performance-based remuneration enhancing their motivation. For financing, patients with hypertension receive preferential medical insurance reimbursement policies when seeking care at primary care facilities. In terms of drug accessibility, both essential medical equipment and fundamental antihypertensive medications are available at the primary care level. For health information systems, regional medical and health information platforms enable health information sharing and service coordination for contracted patients.

**Conclusion:** Primary health care institutions bear responsibility for the long-term follow-up and management of hypertension patients. To further improve primary hypertension management, it is essential to enhance comprehensive primary health governance and service delivery capacity, strengthen primary health workforce development, refine medical insurance reimbursement and payment systems, improve drug and equipment conditions for hypertension treatment at the primary care level, and effectively empower primary hypertension management through information technology development.

**Keywords:** Health System; Hypertension; Primary Health Care; Chronic Disease Management

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Hypertension is the most common chronic non-communicable disease affecting public health in China and represents the most prevalent and significant risk factor for cardiovascular and cerebrovascular diseases [1]. According to the *China Cardiovascular Health and Diseases Report 2021*, the prevalence of hypertension among adults aged 18 and above in China has reached 27.5% [2], with a 逐年上升 trend. The persistent nature of this disease and its severe complications impose a heavy burden on both individuals and society [3]. Although treatment modalities have improved significantly in recent years, hypertension control rates in China remain low. National survey data indicate that awareness, treatment, and control rates among adults aged 18 and above are 46.9%, 40.7%, and 15.3%, respectively, with control rates among treated patients only reaching 37.5% [4]. As a critical gateway for hypertension management and control, the capacity of primary care directly influences management effectiveness. With the deepening reform of essential public health services and the advancement of primary

health service system construction, chronic disease management in primary care has developed rapidly in China, giving rise to various distinctive management models. Analyzing these models through the lens of integrated service delivery systems is essential to understand their operational status and common patterns. This study selected representative regions with exemplary primary hypertension management models in China, conducted semi-structured interviews with key stakeholders guided by the WHO health system framework, analyzed typical experiences and existing problems, and provided policy recommendations for optimizing primary hypertension management models.

### 1.1 Study Participants

Freeman defines stakeholders as "any individual or group that can affect or is affected by the achievement of organizational objectives" [5]. Accordingly, this study defines stakeholders in primary hypertension control and management as organizations, groups, and individuals involved in primary hypertension management activities who can influence management outcomes to varying degrees. Based on stakeholder theory, we identified 29 interviewees from representative regions including Chaoyang District in Beijing, Gongshu District in Hangzhou (Zhejiang Province), Shapingba District in Chongqing, Chengyang District in Qingdao (Shandong Province), and Yi'an District in Tongling (Anhui Province). The participants comprised eight regional health administrators, two regional medical insurance administrators, three community health center managers, nine community general practitioners, two specialists from higher-level hospitals, and five patients with hypertension. Detailed participant information is presented in Table 1 .

### 1.2 Study Content

We analyzed the qualitative data using the six dimensions of the WHO health system monitoring and evaluation framework. A health system consists of all organizations, institutions, resources, and people whose primary purpose is to improve health, encompassing activities that influence health determinants and directly enhance health outcomes [6]. Health systems deliver preventive, promotive, curative, and rehabilitative interventions through the integration of public health actions and health care services. According to the WHO health system framework [7], six building blocks—leadership and governance, service delivery, health workforce, financing, access to essential medicines, and health information systems—form the foundation for health system strengthening. Leadership and governance, along with health information systems, provide the basis for health system policy and management. Health financing and workforce represent critical inputs, while service delivery and drug accessibility reflect direct system outputs, namely the provision and distribution of health services.

### 1.3 Data Collection Methods

This study employed semi-structured interviews for data collection, a common qualitative method frequently used in health services research [8]. Due to the COVID-19 pandemic, we conducted interviews through a combination of online video calls and face-to-face meetings between November and December 2021. Trained researchers with epidemiological investigation experience conducted focus group discussions and one-on-one in-depth interviews using a pre-designed interview guide. The guide covered hypertension management policies and systems, primary care team building, essential equipment and drug availability, current status of standardized hypertension management, medical insurance payment for primary hypertension management, informatization and smart healthcare development, implementation effectiveness and distinctive advantages of local management models, and policy recommendations. Interviewers adapted question sequences and wording as appropriate to suit interviewees and contexts, with each session lasting 1–2 hours. All interviews were audio-recorded with consent and transcribed for textual analysis. Additional information, such as documents and workflow files, was collected from some participants via WeChat or phone follow-ups.

Based on preliminary literature review [9-18] and expert consultation, we identified five successful primary hypertension management models in China: the "Three Highs Co-management, Six Diseases Joint Prevention" integrated prevention-treatment chronic disease management model (Shandong Province), the "Five Integrations" prevention-treatment health management service model (Chongqing), the "1+1+1+X" integrated prevention-treatment general practitioner contracted management model (Zhejiang Province), the "1+1+N" family doctor contracted service model (Anhui Province), and the "Doctor-Nurse-Assistant" hypertension management model (Beijing). Table 2 summarizes the experiences of these five regional models across the six WHO health system dimensions.

### 2.1 Leadership and Governance

The family doctor contracted service system serves as the foundation for primary hypertension management, with continuous policy improvements and robust support systems creating an enabling environment for health promotion. Regional collaborative management operates through medical consortia as the coordinating mechanism, engaging multiple departments in vertical and horizontal collaboration with shared benefits and risks. Specialized performance assessment systems incorporate indicators such as service coverage and standardized management rates. Anhui Province implements a "dual-card system" where residents swipe their ID cards after receiving health services to evaluate providers through their system login IDs, ensuring both service quality and authenticity. Chongqing conducts chronic disease management under the guidance of the CDC with regular performance evaluations. Chronic disease integrated clinic establishment involves setting up standardized hypertension clinics to pro-

vide comprehensive integrated prevention-treatment services for contracted residents.

### 2.2 Service Delivery

Family doctor contracted services form the basis of hypertension management, with innovative features tailored to local contexts. Anhui Province offers tiered service packages based on disease risk stratification. Chongqing integrates health management into daily clinical practice, providing extended services such as priority appointments, follow-up visits, and day care for contracted residents. Beijing standardizes hypertension management services to build trusted relationships with contracted patients. Intelligent collaborative management leverages "Internet+" and big data analytics for human-computer synergy. Anhui developed an "intelligent medical assistant" for stratified chronic disease management, while Shandong established an online chronic disease management system that automatically generates annual follow-up schedules, complication assessments, and reminders for patients with poor adherence. Community-based blood pressure screening involves annual blood pressure measurements for residents aged 35 and above, with referrals for abnormal results and follow-up within two weeks to integrate patients into primary hypertension management. High-quality medical resources are channeled to primary care through regular specialist consultations and joint clinics at community facilities, enhancing standardized management capabilities. Green channels for two-way referrals provide contracted patients with priority access to higher-level hospitals, facilitating a tiered diagnosis and treatment system with vertical integration and coordinated management of acute and chronic conditions. Long-term prescriptions of up to three months are available for stable patients. Personalized health education is delivered through WeChat 推送, "five-entry"activities (into communities, schools, enterprises, institutions, and families), and peer education via WeChat groups to strengthen patient self-management skills.

### 2.3 Health Workforce

Family doctor service teams, comprising community general practitioners (family doctors) and community nurses (contracted assistants), bear primary responsibility for hypertension management. Depending on local circumstances, multidisciplinary experts including public health physicians, specialists from higher-level hospitals, pharmacists, traditional Chinese medicine practitioners, psychologists, and community volunteers are integrated into the teams. Performance-based remuneration follows a regional unified system with regular assessments, rewarding excellence and productivity to enhance motivation. A positive organizational culture and employee benefits foster a "family-like"hospital environment, promoting virtue, learning, and professional development through training and continuing education opportunities.

### 2.4 Financing

Contracted patients receive one-time medication subsidies funded by medical insurance and initial signing bonuses from the government. Preferential medical insurance support at primary care facilities reduces out-of-pocket expenses for contracted patients with hypertension, who can also apply for special disease reimbursement based on DRG payment mechanisms. Family doctor signing fees provide economic support for hypertension management, with teams receiving annual payments per contracted patient shared among medical insurance funds, essential public health service funds, and patient contributions. Specific standards and sharing ratios are determined locally. In some regions, surplus medical insurance funds under global budget arrangements are retained by primary care institutions as performance-based rewards, while deficits are not compensated.

### 2.5 Access to Essential Medicines

Essential medicines for hypertension are guaranteed at primary care facilities with availability rates exceeding 80%, primarily consisting of domestically produced and volume-based procurement drugs. Basic medical equipment is available to meet fundamental diagnostic needs, with regional medical consortia providing support for tests unavailable at the primary care level. Innovative services enhance medication accessibility, such as Beijing' s "medicine delivery" service where community doctors procure and distribute medications for contracted residents, and Zhejiang' s arrangement allowing contracted patients to purchase medications at designated pharmacies with medical insurance coverage.

### 2.6 Health Information Systems

Regional chronic disease management information platforms use resident ID numbers as unique identifiers to establish health records, ensuring interoperability across all levels of care. Health kiosks at primary care facilities integrate patient information to provide continuous, integrated chronic disease management. Intelligent devices support collaborative care, including AI-powered "intelligent medical assistants" for family doctors, dedicated smart devices for follow-up management, and voice-assisted systems for data collection and health guidance. Patient-facing health information APPs enable contracted residents to access family doctor information, make appointments, query health records, and receive follow-up services anytime, anywhere. Hospital director decision-support systems facilitate data extraction and analysis to ensure continuous improvement in medical service and health management quality.

### 3.1 Impact of Leadership and Governance on Hypertension Management

Current primary hypertension management primarily relies on family doctor contracted services, which have been piloted in China since June 6, 2016. The

policy focuses on breakthroughs in service delivery methods, content, payment, assessment, and incentive mechanisms, prioritizing coverage for elderly individuals, pregnant women, children, people with disabilities, and patients with chronic diseases such as hypertension and diabetes, as well as those with severe mental disorders [19]. Family doctors serve as the first point of contact for contracted health services, providing basic medical and public health services with differentiated and personalized benefits in medical access, referral, medication, and insurance coverage.

Multi-sectoral collaboration forms the essential foundation for primary hypertension management, referring to the division of labor, operational processes, and interactions among relevant departments in community-based chronic disease prevention and control [20]. Inadequate horizontal and vertical collaboration mechanisms within primary hypertension management networks significantly impact management effectiveness. Building a community of shared interests through benefit and risk sharing represents a crucial strategy for fostering effective inter-departmental and inter-institutional cooperation.

### 3.2 Impact of Service Delivery on Hypertension Management

Under the framework of regional medical consortia, primary hypertension management receives substantial support from higher-level hospitals. Specialists conduct regular consultations or joint clinics at community facilities, delivering high-quality care while enhancing standardized management capabilities. Primary care institutions also reserve a proportion of appointments and beds at higher-level hospitals for contracted patients, facilitating priority access and breaking down barriers to tiered diagnosis and treatment.

Integrated prevention-treatment services tailored to individual patient needs represent the future direction of primary hypertension management. By embedding health management into daily clinical practice and addressing specific health conditions and needs, primary care can provide personalized services including health assessments, rehabilitation guidance, home visits, family nursing, traditional Chinese medicine preventive care, and remote monitoring via wearable devices. Smart technologies make health information accessible anytime, anywhere. Additionally, primary care institutions increasingly emphasize health education and screening through community lectures and WeChat public account promotions to raise health awareness. Enhanced blood pressure monitoring enables early detection, treatment, referral, and follow-up, shifting the management focus upstream.

### 3.3 Impact of Health Workforce on Hypertension Management

Primary hypertension management is primarily undertaken by family doctor teams, though some regions face challenges with unclear internal division of labor and heavy workloads for general practitioners, affecting service quality and motivation. Establishing unified assessment and evaluation systems with

clear performance-based incentive schemes is essential for comprehensively and objectively evaluating work, rewarding excellence and productivity to enhance staff motivation and improve standardized hypertension management.

### 3.4 Impact of Financing on Hypertension Management

For patients, contracted family doctor services for hypertension treatment and management offer preferential medical insurance support. The *Guiding Opinions on Promoting Family Doctor Contracted Services* explicitly proposes differentiated policies for contracted residents in medical access, referral, medication, and insurance coverage. Current practices reduce deductibles and increase reimbursement rates to alleviate financial burdens and enhance willingness to use contracted services.

For primary care institutions, family doctor signing fees constitute the economic pillar supporting hypertension management. Teams receive annual fees per contracted patient, shared among medical insurance funds, essential public health service funds, and patient payments, with specific standards determined locally. A key challenge is the separation between basic medical services (covered by insurance) and basic public health services (funded by dedicated public health budgets), which creates operational difficulties under integrated prevention-treatment service delivery. Further exploration is needed to develop reasonable fee structures and payment methods that truly benefit family doctor teams.

### 3.5 Impact of Drug Accessibility on Hypertension Management

Daily antihypertensive medications at primary care facilities face certain restrictions in variety and quantity. While essential drug availability meets regulatory requirements, improvement is needed, particularly in rural primary care facilities where accessibility lags behind urban centers [21]. Most hypertension patients are elderly with multiple chronic conditions requiring polypharmacy, yet family doctors often lack comprehensive information about their full medication profiles, making it difficult to assess rational drug use. Personalized medication needs remain unmet, with some specialized drugs only available at higher-level hospitals. Restrictions on long-term prescriptions for certain drugs also create inconvenience for patients.

### 3.6 Impact of Health Information Systems on Hypertension Management

Information technology facilitates hypertension management for both providers and patients. Regional health information platforms enable sharing of health records, electronic medical records, and test reports across institutions, while remote medical equipment and instant communication devices reduce physical distances for consultations and technical exchanges with specialists. Patient-facing mobile health APPs create communication platforms for family doctors

and contracted residents, facilitating health information collection, consultation, appointment scheduling, report queries, interactive communication, patient feedback, and health management.

However, system incompatibility remains a challenge. Public health systems, medical service systems, and medical insurance information platforms have not yet achieved full interoperability, creating information silos between departments and imposing heavy duplicate data entry burdens on primary care staff. Cumbersome system operations result in low satisfaction among health workers and compromise data authenticity, timeliness, and accessibility.

## 4 Conclusion

As the main battlefield for hypertension management, the capacity of primary health care institutions directly influences future trends in cardiovascular and cerebrovascular diseases in China. Through continuous practice and exploration, effective management models have emerged. At the leadership and governance level, family doctor contracted services facilitate multi-disease and multi-sectoral joint management. For service delivery, personalized integrated general and specialty services meet patient needs while emphasizing community health education and blood pressure monitoring. Regarding health workforce, family doctor teams led by community general practitioners are the main force, with performance-based remuneration enhancing motivation. For financing, preferential insurance reimbursement for contracted patients improves adherence. For drug accessibility, essential equipment and medications must be available at primary care facilities with seamless channels to higher-level hospitals for personalized needs. For health information systems, regional platforms enable health information sharing and coordination. To further improve primary hypertension management, comprehensive primary health governance and service delivery capacity must be enhanced, workforce development strengthened, insurance reimbursement and payment systems refined, drug and equipment conditions improved, and information technology effectively leveraged to empower primary care.

**Author Contributions:** WANG Yao was responsible for data analysis, conceptualization, writing, and revision. QIN Tingting, GU Mingyu, BAI Xinyuan, QIAO Kun, and YANG Yutong conducted interviews and data collection. LI Xingming was responsible for quality control and final approval of the manuscript. All authors confirmed the final version.

**Conflicts of Interest:** None declared.

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*Note: Figure translations are in progress. See original paper for figures.*