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Postprint of a Qualitative Study on the Current Status of Hypertension Health Management in Rural Shandong Province Based on the ICCC Framework

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Abstract

Background The prevalence of hypertension in rural China poses a serious public health challenge, making hypertension health management in rural areas of particular importance. Objective Based on the Innovative Care for Chronic Conditions (ICCC) framework proposed by the World Health Organization (WHO), summarize the characteristics and deficiencies of hypertension health management in rural areas of Shandong Province and propose targeted recommendations. Methods According to the level of socioeconomic development and the geographic distribution of hypertension prevalence in Shandong Province, 3 county-level CDCs, 9 township health centers, and 36 village clinics located in County A of Heze City, District B of Jinan City, and City C of Weihai City were selected as sample sources. Using purposive sampling, a total of 84 participants, including hypertension project managers at all levels, medical staff, and hypertensive patients, were selected as interviewees from June to July 2021. Face-to-face semi-structured interviews were conducted to understand the current status of hypertension health management in rural areas of Shandong Province. NVivo 12 software and the "comprehensive method" proposed by Miles and Huberman were used to code and analyze the interview texts around the macro-, meso-, and micro-level elements of the ICCC framework. Results Regarding the current status of hypertension health management in rural areas of Shandong Province, a total of 13 first-level nodes and 51 second-level nodes were extracted from the macro, meso, and micro levels. At the macro level, hypertension health management in rural areas of Shandong Province generally enjoys a positive policy environment, implementing national chronic disease health management policies and promoting chronic disease health management. However, prominent issues include an imperfect policy system framework, suboptimal integration within the health system, shortage of professionals specialized in hypertension

health management, and inadequate financial support. At the meso level, various medical and health institutions strive to improve the continuity of medical services, but further strengthening is needed in organizing and equipping family doctor teams, promoting and utilizing information systems, and other aspects. At the micro level, the coordination between patients and families and family doctor teams, as well as the motivation of both parties to participate in hypertension health management, need to be improved. Conclusion The overall implementation of hypertension health management in rural areas of Shandong Province is satisfactory, yet it remains necessary to: vigorously strengthen the government' s leadership and supervisory role, formulate and integrate relevant policies, and promote departmental integration; increase financial support to address the weaknesses of relatively scarce health human resources and weak information system construction in rural areas, thereby advancing high-quality medical services; and value the interaction among patients and families, health service teams, and community partners to promote patient self-management.

Full Text

Qualitative Study of Health Management for Hypertensive Patients in Shandong' s Rural Areas Using the Innovative Care for Chronic Conditions Framework

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【Abstract】
Background: As the prevalence of hypertension in China' s rural areas is very high, hypertension management in these areas is particularly important.
Objective: To summarize the characteristics and weaknesses of hypertension management in Shandong' s rural areas using the Innovative Care for Chronic Conditions Framework (ICCC) proposed by the WHO, and to put forward targeted recommendations.
Methods: According to the socio-economic level and geographical distribution of hypertension prevalence in Shandong Province, three county-level centers for disease control and prevention, nine town health centers, and 36 village clinics were selected from A County in Heze, B District in Jinan, and C City in Weihai. From June to July 2021, a purposive sampling method was used to select 84 participants, including hypertension program managers at various levels, medical workers, and hypertensive patients, for face-to-face semi-structured interviews to understand the status of hypertension management in Shandong' s rural areas. NVivo 12 and the Qualitative Data Analysis Model proposed by Miles

and Huberman were used to encode and analyze the interview results using the macro-, meso-, and micro-level components of the ICCC.
Results: A total of 13 themes and 51 subthemes were derived from the analysis at three levels. At the macro level, the implementation of hypertension management in Shandong' s rural areas was generally in a positive policy environment, such as implementing national policies regarding chronic disease management and publicizing chronic disease management, but the policy framework was not complete, the integration within the departments in the health system was poor, and shortages of professional hypertension managers and sufficient financial support were serious. At the meso level, various medical institutions strived to promote the continuity of medical services, but the organization and deployment of family doctor teams and the promotion and use of information systems still needed to be further strengthened. At the micro level, the cooperation between patients and their families and the family doctor team needed to be improved, and the involvement of patients and their families in hypertension management should be enhanced as well.
Conclusion: The implementation of hypertension management in Shandong' s rural areas is good generally, but the following efforts should be made for improvements: vigorously strengthening the leadership and supervision role of the government, formulating and integrating relevant policies, and promoting the integration of relevant departments; increasing financial support, and addressing the relatively shortage of health human resources and improving the weakness of informatization construction in rural areas to promote the delivery of high-quality medical services; attaching importance to the interaction between patients and families, health service team and community partners to promote patients' self-management.

【Key words】 Innovative Care for Chronic Conditions Framework; Rural; Hypertension; Health management; Qualitative research; Shandong

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Hypertension is one of the most common chronic diseases and a major risk factor for cardiovascular disease. The number of hypertensive patients in China has reached nearly 300 million, with a prevalence rate of 27.5% that continues to rise. The direct economic burden attributable to hypertension accounts for 6.61% of total health expenditures. As population aging deepens, more than half of the elderly population currently suffers from hypertension, with the prevalence exceeding 90% among those over 80 years old. Compared to urban areas, rural hypertensive patients have lower overall income, family economic conditions, education levels, health literacy, and access to medical resources. A national survey showed that the prevalence of hypertension in rural areas (crude rate 28.8%) is higher than in urban areas (crude rate 26.9%), while awareness, treatment, and control rates are far lower in rural areas, making hypertension management particularly important in these settings. Hypertension imposes a heavy disease burden on individuals, families, and society, becoming a major public health problem that urgently requires government-led management

efforts.

Understanding and analyzing the current status of hypertension management in rural areas is crucial for improving efficiency and quality. However, few scholars have deeply explored the characteristics and deficiencies of rural hypertension management through qualitative research. The WHO proposed the Innovative Care for Chronic Conditions (ICCC) framework in 2002. Practice has proven that the ICCC framework is more applicable for analyzing chronic disease prevention and management models in low- and middle-income countries, providing references for solving problems such as fragmented health services, lack of infrastructure, and low resource utilization. Therefore, this study analyzes the current status of hypertension management in rural Shandong based on the ICCC framework to summarize its characteristics and deficiencies and propose targeted recommendations.

1.1 Theoretical Basis

The ICCC framework comprises three levels: building a positive policy environment (macro level), coordinated healthcare organizations and communities (meso level), and prepared, informed, and proactive three parties (micro level). The macro level includes six components: leadership and advocacy, strengthening intersectoral partnerships, policy integration, financing, workforce development, and legislative support. The meso level includes healthcare organizations and communities. Healthcare organizations should promote continuous and coordinated services, optimize services through leadership and incentives, organize and equip health service teams, promote and use information systems, and support patient self-management and prevention. Communities should take measures to raise public awareness, improve outcomes through leadership and support, organize and coordinate community resources, and provide complementary services. The micro level includes prepared, informed, and proactive patients and families, health service teams, and community partners. The three levels interact and are inseparable; only by organically combining them can each component' s role be maximized to achieve optimal chronic disease management outcomes [Figure 1: see original paper].

1.2 Study Subjects

Based on socio-economic levels and the geographical distribution of hypertension prevalence in Shandong Province, three county-level CDCs, nine town health centers, and 36 village clinics were selected from A County in Heze, B District in Jinan, and C City in Weihai. From June to July 2021, purposive sampling was used to select hypertension program managers at all levels, medical workers, and hypertensive patients as interview subjects. Hypertension program managers were directors of chronic disease departments at county CDCs and town health centers. Medical workers were doctors familiar with chronic disease management at town health centers and village clinics. Inclusion criteria for hypertensive patients were: (1) permanent rural residents (having lived in rural areas

for more than 6 months in the past year) with rural household registration; (2) diagnosed with hypertension; (3) clear consciousness and ability to answer questions correctly; (4) informed consent and voluntary participation. Sample size was determined by information saturation; interviews were terminated when no new important information emerged. Ultimately, 12 hypertension program managers, 36 medical workers, and 36 hypertensive patients (totaling 84 participants) underwent semi-structured interviews. This study was approved by the Medical Ethics Committee of the Centre for Health Management and Policy Research, Shandong University (Approval No.: ECCHMPSDU20210404), and all participants signed informed consent forms.

1.3 Data Collection Methods

Based on research objectives, an interview outline was initially developed through literature review. Six target subjects (two from each participant group) were pre-interviewed to test the outline quality. The research team revised the outline through repeated discussion based on pre-interview results to form the final version. The outline for hypertension program managers covered five aspects: (1) implementation of hypertension management measures; (2) intersectoral partnerships (e.g., which departments participate in hypertension management and how they cooperate); (3) policies and legislation (e.g., whether chronic disease prevention plans have been formulated); (4) funding (e.g., sources and adequacy of special funds); and (5) workforce development (e.g., human resources and training measures). The outline for medical workers covered three aspects: (1) healthcare service provision (e.g., continuity and accessibility); (2) health service team deployment (e.g., family doctor contract services); and (3) information system usage (e.g., information sharing between institutions). The outline for hypertensive patients covered five aspects: (1) health knowledge; (2) health behaviors; (3) family support; (4) family doctor service enrollment; and (5) medication adherence.

Before formal interviews, interviewers introduced themselves and explained the background, purpose, and main topics to gain participants' trust. Interviewers comprised six teachers, master' s, and doctoral students from Shandong University's Centre for Health Management and Policy Research, all with rich interview experience and systematic qualitative research training. Two additional master' s students served as recorders. Each interview lasted 60-90 minutes. With participants' consent, interviews were audio-recorded, and expressions, gestures, and key statements were documented. Within 24 hours after each interview, two recorders independently transcribed the recordings, resolving discrepancies through discussion. Transcripts were then returned to participants for review to ensure authenticity and credibility.

1.4 Data Analysis Methods

NVivo 12 software was used for coding and analysis. Considering text complexity, the "comprehensive approach" proposed by Miles and Huberman was

adopted, combining deductive and inductive methods with a preliminary hypothesis. The coding process involved: first, splitting and categorizing interview documents by participant type; second, identifying 13 first-level nodes based on interview content and ICCC framework levels; and third, using inductive methods to form 51 second-level nodes by analyzing semantically similar statements. To ensure accuracy, two researchers independently coded the data using NVivo 12, resolving discrepancies through group discussion. Ultimately, 13 first-level nodes and 51 second-level nodes were identified, with 1,304 total coding references.

2.1 Macro Level: Policy Environment for Hypertension Management in Rural Shandong

Leadership and Advocacy: Conducting publicity and health education activities effectively raises public awareness of chronic disease prevention. Interviews revealed that all regions implemented multiple measures under government leadership to publicize hypertension knowledge. 22.2% (8/36) of villages regularly held hypertension health lectures and played educational videos, while 25.0% (9/36) created brochures and bulletin boards. B District also organized annual "Salt Reduction and Hypertension Prevention Day" events. However, 58.3% (7/12) of hypertension program managers noted that these measures were less effective due to low education levels and hearing impairment among elderly patients, with insufficient effort and superficial implementation.

Strengthening Intersectoral Partnerships: Strong partnerships between government departments improve chronic disease management outcomes. 27.8% (10/36) of villages had relatively close connections between health systems and departments such as housing construction, education, and market supervision. For example, B District' s CDC co-planned a "Healthy Walking Street" with the Housing Construction Bureau, A County' s CDC conducted "Hand in Hand" activities with schools, and C City' s CDC organized "Salt Reduction in Restaurants" events with the Market Supervision Bureau. However, 75.0% (9/12) of hypertension program managers reported weak internal health system linkages, particularly lacking top-level design for medical-preventive integration. As one manager noted, "No department guides how to integrate; 'medical care' remains with healthcare institutions while 'prevention' stays with CDCs."

Policy Integration and Legislative Support: The ICCC framework states that policies can protect chronic disease patients' rights, and policy integration reduces overlap. While all regions followed the "China Hypertension Health Management Guidelines," with B and C districts also formulating local chronic disease prevention plans, 58.3% (7/12) of managers reported few policies specifically for rural hypertension management and poor policy integration. One manager explained, "The total public health funding pool is fixed, with some money mandatory for village doctors. But some are too old with poor eyesight to perform duties. How do we pay them? It' s like two policies 'fighting' each other."

Financial Support: The ICCC framework identifies financing as crucial for strategy implementation. Hypertension management funding came solely from basic public health funds, with 41.7% (5/12) of managers reporting insufficient, delayed, or non-earmarked funds. One manager stated, "Chronic disease management funds come from basic public health funds with almost no other sources or special hypertension funds." However, managers in B and C districts noted that COVID-19 did not reduce basic public health funding or hypertension management proportions.

Workforce Development: Educating chronic disease management personnel promotes high-quality primary healthcare. While 50.0% (6/12) of managers reported regular training, effectiveness and assessment results were poor. 58.3% (7/12) noted workforce issues including low education levels, advanced age, weak professional skills, and shortages of high-level talent. Regarding COVID-19 impact, one manager said, "We were already short-staffed, then had to allocate personnel for epidemic control," while another noted, "With COVID-19, chronic disease management positions are even more 'understaffed' ." First and second-level nodes at the macro level are shown in Table 1 .

2.2 Meso Level: Healthcare Organizations and Communities

Promoting Continuous and Coordinated Services: Primary healthcare institutions should provide continuous, coordinated services throughout the disease course. Besides basic diagnosis and treatment, institutions conducted follow-ups twice per quarter with good implementation. While most provided referral services, 22.2% (8/36) of medical workers reported difficulties due to patient source competition, with lower-level institutions reluctant to refer upward and higher-level institutions unwilling to discharge patients downward.

Using medical alliances to conduct hypertension management helps primary care workers provide coordinated services. Only 11.1% (4/36) of village clinics utilized medical alliances, with one worker noting, "Medical alliance work is progressing; higher-level institutions do support lower-level ones."However, most had established frameworks without substantive implementation. One stated, "The medical alliance is just a name here with no real action. It's a good national policy but meaningless for us," while another explained, "Medical alliance work hasn' t been well implemented. Some technologies require guidance from higher-level professionals, but nobody comes."

Optimizing Services Through Leadership and Incentives: County-level institutions mainly provide guidance and supervision, such as C City' s CDC quarterly review of 10 follow-up reports. However, 66.7% (24/36) of medical workers reported low motivation and lack of incentive mechanisms, with insufficient supervision. One worker noted, "There are no incentive measures currently, let alone rewards. Everyone is almost unwilling to work."

Organizing and Equipping Health Service Teams: The ICCC framework

requires health service teams (primarily family doctor teams in this study) to have adequate resources, equipment, and expertise. Family doctor teams typically comprised clinicians, nurses, and public health staff but rarely general practitioners, with each team managing one area based on village population size. While one worker stated, "Family doctor teams aren' t just nominal; they oversee public health projects and conduct health lectures," 75.0% (27/36) reported that teams were established mainly to meet policy requirements and pass inspections. Low efficiency and enrollment rates resulted from few specialists, poor teamwork, and lack of economic incentives, with significant gaps compared to advanced domestic and international models.

Promoting and Using Information Systems: Medical information systems support hypertension management as auxiliary tools for follow-up and care. Only 27.8% (10/36) of village clinics used information systems, with one worker noting, "The system reduces our burden; we can see patients' health records and provide telemedicine." However, 72.2% (26/36) had not achieved information connectivity due to human, financial, and material constraints. One explained, "The information system isn' t perfect; we can' t see patients treated by other institutions," while another noted, "Village doctors are too old to use smartphones or computers, making system promotion impossible."

Supporting Patient Self-Management and Prevention: To guide patients in preventing complications and self-management, most areas distributed "oil-limiting pots"and "salt-limiting spoons,"with medical workers reminding them to measure blood pressure regularly and take medication. However, 52.8% (19/36) of workers reported poor implementation effects due to low education levels and weak prevention awareness among elderly rural patients. First and second-level nodes at the meso level are shown in Table 2 .

2.3 Micro Level: Prepared, Informed, and Proactive Three Parties

The micro level depends on the joint action of patients and families, health service teams, and community partners. Only when all three parties are prepared, informed, proactive, and work together can hypertension management achieve good results.

Prepared, Informed, and Proactive Patients and Families: Most hypertensive patients were aware of their condition and actively receiving treatment, but only 5.6% (2/36) had home blood pressure monitors. 47.2% (17/36) of medical workers reported that some elderly patients had difficulty changing their thinking and behaviors, with weak self-management skills, poor medication adherence, and frequent non-compliance. One worker noted, "Some villagers don' t listen; we ask them to come for blood pressure checks and they don' t, ask them to take medicine and they don' t do it properly." One elderly patient stated, "I take medicine when I have headaches indicating high blood pressure, and stop when I feel better," while another said, "I never measure blood pressure

and don' t know I have hypertension." Regarding family support, 22.2% (8/36) of patients mentioned lacking direct support due to children working away or deceased spouses.

Prepared, Informed, and Proactive Health Service Teams: 47.2% (17/36) of medical workers noted that insufficient rural health human resources prevented full implementation of contracted patient management, while 55.6% (20/36) of patients didn' t know what family doctor contract services were.

Prepared, Informed, and Proactive Community Partners: The ICCC framework defines community partners as groups of non-professionals providing complementary services. However, 94.4% (34/36) of medical workers reported that most rural youth work away from home, leaving elderly residents who cannot easily form groups, so community partners have not yet played a role in rural areas. First and second-level nodes at the micro level are shown in Table 3 .

Discussion

The ICCC framework's guiding principles—evidence-based decision-making, population focus, prevention focus, quality focus, integration, and flexibility—align with China' s "Chronic Disease Prevention and Control Medium- and Long-term Plan (2017-2025)" principles of "coordinated planning, shared development, prevention first, and classified guidance." The framework' s three-level structure also matches the concept of "improving government-led, department-coordinated, society-mobilized, and public-participated comprehensive chronic disease prevention and control mechanisms." Research by Wang Lu et al. also indicates the ICCC framework' s suitability for analyzing chronic disease management in low- and middle-income countries. Therefore, applying the ICCC framework to analyze rural hypertension management in Shandong is appropriate and significant.

3.1 Macro Level

At the macro level, rural hypertension management in Shandong operates in a generally positive policy environment but faces many deficiencies. Due to limited knowledge among rural elderly, health lectures and other promotional activities have poor effects. Internal health system linkages are loose, particularly lacking top-level design for medical-preventive integration, which differs from Yuan Shasha et al.' s findings, possibly due to sampling differences. While policies and laws can protect patients' rights and workforce education can promote high-quality primary care, rural hypertension management still faces incomplete policy frameworks, single funding sources, insufficient funds, and professional talent shortages, seriously hindering development. Therefore, we recommend: strengthening superior departments' guidance and supervision; implementing targeted publicity for rural elderly patients through methods like home visits with brochures and demonstrations of salt/oil limiting tools; improving policy

top-level design to strengthen internal and external partnerships and reduce policy overlap; and increasing funding while providing professional training and introducing high-quality talent to improve management efficiency and quality.

3.2 Meso Level

At the meso level, medical workers can improve service continuity through follow-ups and other measures. However, most institutions still face problems including unimplemented referrals and lack of incentive mechanisms, consistent with Xu Jialin et al.' s findings. Medical alliances can integrate institutions to provide continuous, efficient, and quality services, but most village clinics haven' t fully utilized them, and information connectivity remains unachieved, reducing service quality and efficiency. Therefore, we recommend: using medical alliances and information systems to conduct follow-ups, referrals, and teleconsultations; establishing scientific evaluation and incentive systems with regular training to promote quality services; and strengthening general practitioner training and family doctor service promotion to improve enrollment rates by learning from advanced domestic and international models.

3.3 Micro Level

At the micro level, although most patients and families are aware of the disease, management effectiveness is poor due to low education levels, difficulty changing behaviors, and poor medication adherence among rural elderly. Low socioeconomic status and lack of knowledge are closely related to poor medication adherence. Additionally, low education and professional levels, high work pressure, and low social recognition of family doctor services directly result in low enrollment rates. Patient self-management capabilities and the roles of family doctor teams and community partners need strengthening. Therefore, we recommend: using family doctor teams, community partners, and internet tools for real-time supervision to improve medication adherence and self-management; conducting "one-on-one" hypertension education to enhance self-management capabilities and proactivity; and improving patients' and families' knowledge and engagement to facilitate efficient hypertension management.

In summary, rural hypertension management in Shandong faces many challenges. Only by organically combining macro, meso, and micro levels can all elements maximize their effectiveness. This study enriches the field through in-depth interviews with managers, medical workers, and patients, analyzed through the ICCC framework. However, limitations exist: all subjects were from Shandong with relatively small sample size and limited coverage, which may not represent national conditions. Additionally, qualitative research cannot fully reveal causal relationships, limiting generalizability. Future research should expand sample size and coverage and combine qualitative and quantitative methods to further analyze rural hypertension management in China.

Author Contributions: ZHANG Shuo and SUN Xiaojie conceived and de-

signed the study; ZHANG Shuo drafted and revised the manuscript; ZHANG Shuo, FU Yingjie, CHANG Lele, and SUN Xiaojie collected data; ZHANG Shuo and FU Yingjie organized and analyzed data; SUN Xiaojie provided quality control and final approval. All authors have no conflicts of interest.

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