Analysis of Current Status and Influencing Factors of Primary Care Physicians' Self-Assessment of Hypertension Health Evaluation (Post-Print)

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Abstract

Background: China has a large number of hypertensive patients, and primary care physicians play an important role in the health management of hypertension. Health assessment, as an important means for hypertension screening, diagnosis, and risk prediction, can detect target organ damage in hypertensive patients early and provide a basis for treatment plan formulation. Currently, the national public health service standards have clear requirements for hypertension health assessment, which has also been implemented in primary care institutions, but there are few reports on the health assessment competence of primary care physicians.

Objective: To understand the self-reported Knowledge-Attitude-Practice (KAP) status of primary care physicians regarding hypertension health assessment and analyze its influencing factors.

Methods: From May to June 2022, a phased cluster random sampling method was used to conduct an online survey of 420 primary care physicians in northern, central, and southern Shanxi Province. The survey content included baseline information of primary care physicians, self-reported KAP status of hypertension health assessment, and the availability of hypertension assessment tools in their institutions. The hypertension health assessment levels of primary care physicians with different characteristics were compared, and influencing factors on primary care physicians' hypertension health assessment levels were analyzed.

Results: The total KAP score of primary care physicians for hypertension health assessment was (127.16$\pm$18.65), $with cognitive dimension score of (53.68\pm8.95)$, $attitude dimension score of (28.$ Multiple linear regression analysis showed that workplace, highest education level, major, whether participated in standardized training, whether studied the latest "National Guidelines for Prevention and Management of Hypertension in Primary Care", whether received health management-related training,

frequency of chronic disease knowledge and skills learning organized by the institution, and weekly self-study duration were influencing factors for primary care physicians' cognition of hypertension health assessment (P<0.05); whether participated in standardized training, employment mode, whether studied the latest "National Guidelines for Prevention and Management of Hypertension in Primary Care" , frequency of chronic disease knowledge and skills learning organized by the institution, and weekly self-study duration were influencing factors for primary care physicians' attitude toward hypertension health assessment (P<0.05); physician qualification status, whether participated in standardized training, whether studied the latest "National Guidelines for Prevention and Management of Hypertension in Primary Care" , whether received health management-related training, frequency of chronic disease knowledge and skills learning organized by the institution, and weekly self-study duration were influencing factors for primary care physicians' practice of hypertension health assessment (P<0.05).

Conclusion: Primary care physicians have a relatively positive attitude toward hypertension health assessment, but there is still room for improvement in cognitive and practical skills. It is urgent to strengthen standardized training of professional knowledge and skills for primary care personnel, improve the incentive and assessment systems of primary care institutions, and stimulate self-directed learning awareness among primary care personnel to enhance primary health care services and standards.

Full Text

Preamble

Current Status and Influencing Factors of Self-Assessed Hypertension Health Assessment Among Primary Care Physicians

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Abstract

Background: Hypertension affects a large population in China, and primary care physicians play a crucial role in its management. Health assessment serves as an essential tool for hypertension screening, diagnosis, and risk prediction, enabling early detection of target organ damage and informing treatment planning. While national public health service specifications clearly define requirements for hypertension health assessment and these have been implemented in primary care settings, few studies have examined the health assessment competencies of primary care physicians.

Objective: To investigate the current status of self-assessed knowledge, attitude, and practice (KAP) regarding hypertension health assessment among primary care physicians and analyze its influencing factors.

Methods: From May to June 2022, we conducted an online survey of 420 primary care physicians in northern, central, and southern Shanxi Province using a phased cluster random sampling method. The survey covered baseline characteristics, self-assessed KAP status regarding hypertension health assessment, and availability of hypertension assessment tools in their institutions. We compared hypertension health assessment levels across different physician characteristics and analyzed influencing factors.

Results: The total KAP score for hypertension health assessment was $(127.16\$\pm18.65), with cognitive dimension scoring (53.68\pm8.95), attitude dimension (28.62\pm4.09), and practiced$ Multiple linear regression analysis revealed that workplace, highest education level, specialty, standardized training completion, familiarity with the latest *National Guidelines for Prevention and Management of Primary Hypertension*, participation in health management training, frequency of institutional chronic disease education sessions, and weekly self-study duration significantly influenced cognitive scores ($P<0.05$). Standardized training, employment status, guideline familiarity, institutional education frequency, and weekly self-study duration significantly influenced attitude scores ($P<0.05$). Physician qualification status, standardized training, guideline familiarity, health management training, institutional education frequency, and weekly self-study duration significantly influenced practice scores ($P<0.05$).

Conclusion: Primary care physicians demonstrate positive attitudes toward hypertension health assessment, though their knowledge and practical skills require improvement. There is an urgent need to strengthen standardized training in professional knowledge and skills, improve incentive and evaluation systems in primary care institutions, and stimulate physicians' self-directed learning to enhance primary healthcare service quality.

Keywords: Primary care physicians; Hypertension; Health assessment; Knowledge-attitude-practice; Influencing factors

Background

Hypertension is a global chronic non-communicable disease and a major risk factor for cardiovascular and cerebrovascular diseases. Its prevalence in China has been increasing annually [1]. In 2018, the awareness, treatment, and control rates of hypertension among Chinese adults were 41.0%, 34.9%, and 11.0%, respectively, with 50.9% identified as having high-normal blood pressure [2], indicating that hypertension prevention and control remains a formidable challenge. Primary care physicians serve as "health gatekeepers" for the general population, and their competency in hypertension health assessment directly impacts early screening, diagnosis, and management of hypertensive emergencies during follow-up [3]. Health assessment is a critical prerequisite and component of hypertension health management [4], providing comprehensive information on physiology, psychology, and lifestyle to support disease screening, diagnosis, and risk prediction [5-6]. Currently, research on hypertension health assessment competency in China is limited, primarily focusing on nursing staff rather than physicians working in rural villages, townships, and community health service centers/stations. This study investigates the self-assessed status and influencing factors of hypertension health assessment among primary care physicians to inform policy development and appropriate technology training.

1.1 Study Subjects

We employed a phased cluster random sampling approach, selecting two counties/districts from northern, central, and southern Shanxi (Jingle County, Hunyuan County, Yushe County, Xiaodian District, Daning County, and Yuanqu County). From each county/district, we randomly sampled 30% of township health centers and their administrative villages, plus 40% of community health service centers/stations. Eligible participants included physicians who voluntarily participated, had worked in primary care for $ $6 months, and were responsible for hypertension management at township health centers, community health service centers/stations, or village clinics. One physician per site was invited to complete the questionnaire. We excluded physicians who refused participation or had been absent from their post for $ $1 year. A total of 420 questionnaires were distributed, with 413 returned. After excluding 11 invalid questionnaires (from identical institutions, showing consecutive patterned responses, contradictory answers, or completion time $ $180 seconds), 402 valid questionnaires were retained.

1.2 Data Collection

The questionnaire was developed based on relevant guidelines [7] and literature [8-10], refined through in-depth interviews with primary care physicians and consultation with provincial primary care experts. After creation on the

Wenjuanxing platform, electronic questionnaires were distributed to local investigators for unified dissemination. The survey covered baseline physician characteristics and a KAP scale for hypertension health assessment, including gender, age, workplace, highest education level, specialty, professional certification status, standardized training completion, monthly income, employment status, years of practice, professional title, number of managed hypertensive patients, familiarity with the latest *National Guidelines for Prevention and Management of Primary Hypertension* (hereinafter "the Guidelines"), prior health management training, frequency of institutional chronic disease education sessions, weekly self-study duration, personal/family history of hypertension or cardiovascular disease, regular blood pressure monitoring habits, availability of hypertension assessment tools, and KAP status regarding hypertension health assessment (comprising 14 knowledge items, 7 attitude items, and 12 practice items, totaling 33 items).

The KAP scale used a 5-point Likert scoring system, with responses ranging from "very unfamiliar" to "very familiar" scored 1-5. The total possible scores were 70 for knowledge, 35 for attitude, 60 for practice, and 165 for overall KAP. Higher scores indicated better KAP status. Item mean scores were calculated as (total item score/number of items)$×100×$100%. Reliability analysis showed Cronbach's α coefficients of 0.949-0.975 for the total scale and three dimensions, Spearman-Brown coefficients of 0.868-0.954, and test-retest reliability of 0.812-0.905. The three-factor model explained 71.309% of cumulative variance, with acceptable structural, convergent, and discriminant validity, demonstrating good reliability and validity.

1.3 Quality Control

Quality control measures were implemented throughout the study. Before the survey, investigators from each institution were briefed on the study's purpose, significance, content, and procedures. The Wenjuanxing-generated QR code was then sent to investigators, who guided participants through the informed consent process. All questionnaire items were mandatory, requiring completion before submission, with each device permitted only one response. After collection, investigators reviewed questionnaires for validity, excluding those from identical institutions with inconsistent answers, obvious consecutive patterned responses, or completion times $ $180 seconds.

1.4 Statistical Analysis

Raw data from Wenjuanxing were imported into Excel for cleaning and then analyzed using SPSS 26.0 and AMOS 26.0. General characteristics were described using frequencies and percentages (%), while measurement data were presented

as mean±standard deviation (x±s). Group comparisons were performed using t-tests or one-way ANOVA. Multiple linear regression analysis identified influencing factors of hypertension health assessment competency. Statistical significance was set at $P<0.05$.

2.1 KAP Scores for Hypertension Health Assessment

The total self-assessed KAP score for hypertension health assessment was $(127.16\$\pm18.65), with a scoring rate of 77.06\pm8.95, 75.71\pm4.09, 81.77\pm\$7.53$, 74.76% scoring rate). The three lowest-scoring items in each dimension are shown in Table 1 .

2.2 Univariate Analysis of KAP Influencing Factors

Table 2 presents comparisons of KAP scores across different demographic characteristics. Significant differences were observed in knowledge scores based on workplace, education level, specialty, standardized training completion, guideline familiarity, health management training participation, institutional education frequency, and weekly self-study duration (all $P<0.001$). Attitude scores differed significantly by standardized training, employment status, guideline familiarity, institutional education frequency, and self-study duration (all $P<0.001$). Practice scores varied significantly by certification status, standardized training, guideline familiarity, health management training, institutional education frequency, and self-study duration (all $P<0.001$).

2.3 Multivariate Analysis of KAP Scores

Variables showing statistical significance in univariate analysis were entered as independent variables (see assignment in Table 3), with knowledge, attitude, and practice scores as dependent variables in multiple linear regression analysis. Results revealed that while influencing factors differed across the three dimensions, weekly self-study duration, guideline familiarity, standardized training completion, and institutional education frequency consistently emerged as significant predictors (Table 4).

2.4 Availability of Hypertension Assessment Tools

Figure 1 [Figure 1: see original paper] illustrates the availability of hypertension assessment tools in primary care institutions.

3.1.1 Knowledge Level Requires Improvement

The knowledge dimension score of (53.68$±$8.95) with a 75.71% scoring rate indicates insufficient mastery of hypertension health assessment knowledge, particularly regarding hypertension grading and stratification, differentiation between primary and secondary hypertension, and essential assessment items. Previous studies [11-12] have similarly reported suboptimal knowledge among physicians. A survey of primary care physicians in 12 counties across 3 cities in Shanxi [8] found low accuracy rates for questions on hypertension classification and stratification, especially among physicians with lower education and professional titles, consistent with our findings. Current challenges in China' s primary care system include inadequate staffing, unreasonable personnel structure, and weak service capacity, with particularly severe aging and low educational attainment among rural doctors whose knowledge is not regularly updated [13], likely contributing to poor cognitive performance.

3.1.2 Positive Attitudes Toward Assessment

The attitude dimension score of (28.62$±$4.09) with an 81.77% scoring rate reflects generally positive attitudes. Most physicians agreed that "health assessment greatly benefits hypertensive patients," "mastering health assessment knowledge and skills is important," and "hypertension health assessment training is necessary," demonstrating awareness of assessment' s significance and the value of training. However, lower scores on items such as "willing to spend time learning health assessment knowledge," "willing to invest effort in comprehensive patient assessment," and "willing to participate in related training" suggest a gap between recognized importance and implementation intention. According to the Theory of Planned Behavior (TPB), behavioral intention is influenced not only by attitude but also by perceived behavioral control and subjective norms [14-15]. Physicians' implementation intentions may be affected by time constraints, workload, evaluation standards, personal competence, and patient satisfaction.

3.1.3 Practice Skills Need Enhancement

The practice dimension score of (44.86$±$7.53) with a 74.76% scoring rate reveals inadequate implementation, particularly in establishing/updating health assessment records, regular calibration of sphygmomanometers, and using electronic platforms for patient management. This suggests insufficient awareness of standardized assessment procedures and limited use of information technology for patient communication. Research [16] shows that IT-based doctor-patient interaction enhances effective communication, patient self-efficacy, and treatment adherence. However, China' s primary care physicians face heavy workloads

and multiple public health responsibilities [17], leaving limited time for comprehensive assessment. Additionally, our survey found scarce assessment tools in primary care institutions—only height-weight scales and tape measures were available in >96% of facilities, while other equipment was severely lacking, especially in village clinics where instrument availability was <25% except for basic anthropometric tools. This resource limitation directly impacts assessment implementation.

3.2 Influencing Factors of KAP Scores

Weekly self-study duration, guideline familiarity, standardized training completion, and institutional education frequency emerged as common significant predictors across all three KAP dimensions, emphasizing that both active learning and formal training influence knowledge, attitudes, and practices. Cheng et al. [18] demonstrated that self-directed learning is crucial for continuous professional development, while continuing medical education (including training) is essential for knowledge updating and improving healthcare quality and competency [19]. In our survey, 246 physicians (61.19%) reported <3 hours of weekly self-study, indicating limited self-directed learning. While most institutions provided adequate training and most physicians had studied the latest guidelines, the training may not meet diverse needs. Given the unique demands of primary care, flexible continuing medical education programs emphasizing short-term and part-time learning should be implemented [13,20] to stimulate learning initiative and improve training effectiveness.

Furthermore, physicians from township/community facilities, medical specialties, and higher education levels demonstrated better knowledge, likely because rural physicians historically had diverse backgrounds, lower educational requirements, and limited formal training. Previous surveys show that higher education correlates with better knowledge and clinical skills [8], highlighting the need for enhanced training management for low-educated rural physicians. Interestingly, physicians with rural doctor certification showed better practice implementation, possibly because rural doctors are the main providers of rural healthcare [21], working closely with patients and capable of comprehensive assessment, follow-up, and education.

In summary, primary care physicians' KAP levels regarding hypertension health assessment are influenced by both individual factors and external factors such as institutional support and government policies. Hospitals and governments should prioritize primary care development, attract more medical graduates to primary care, improve incentive and evaluation systems, implement tiered training programs, increase financial investment, and supplement essential diagnostic equipment to enhance physicians' initiative and chronic disease management capacity.

Limitations

This study was limited to Shanxi Province, where economic development, medical conditions, and physician competency may differ from other regions, potentially introducing bias. Future multi-center, large-scale studies are needed for more representative findings.

Conclusion

Primary care physicians, as the main force in health management, should accurately and timely diagnose and assess hypertension while providing patients with disease prevention knowledge. Our study found that while physicians hold positive attitudes toward hypertension health assessment, their knowledge and practice implementation require substantial improvement. Weekly self-study duration, guideline familiarity, standardized training completion, and institutional education frequency are critical influencing factors. Since knowledge is essential for behavior change, targeted education should address weaknesses in theoretical knowledge and practical skills to strengthen health assessment competency and improve primary care services for common chronic diseases.

Author Contributions

Na-Meng Wang conceived the research question, designed the study, implemented the investigation, and drafted the manuscript. Na-Meng Wang, Kang Liao, Rong-Rong Wei, and Xue-Ting Bai collected and organized data and performed statistical analysis. Kang Liao and Li-Qi Li supervised quality control and manuscript revision. Li-Qi Li secured funding, provided guidance on manuscript writing, and takes overall responsibility for the work.

Conflict of Interest: The authors declare no conflict of interest.

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