General Practitioner Perspectives on Barriers to Monitoring and Management of Type 2 Diabetes Mellitus with Chronic Kidney Disease: A Qualitative Study (Postprint)

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Abstract

Background The prevalence of type 2 diabetes mellitus is continuously increasing in China. General practitioners play an important role in the prevention and treatment of type 2 diabetes mellitus and its complications. Chronic kidney disease (CKD) is a common comorbidity in diabetic patients; however, there is currently limited research evidence on the comprehensive prevention and treatment of type 2 diabetes mellitus combined with CKD in primary care settings in China.

Objective To understand the barriers in monitoring and management of type 2 diabetes mellitus combined with CKD in community settings from the perspective of general practitioners.

Methods From May to July 2022, general practitioners were selected through snowball sampling in an urban district of Beijing for one-on-one semi-structured interviews. The interview outline was developed based on the Theoretical Domains Framework (TDF). NVivo 11 software was used to code and categorize the interview content, and thematic framework analysis was employed to organize and analyze the data, with themes being extracted.

Results This study interviewed 13 general practitioners, whose years of experience in general practice ranged from 8 to 22 years. The study identified barriers related to six domains in the TDF, namely knowledge/skills, beliefs about consequences, motivation and goals, medical context, resources, and behavioral norms. Further refinement revealed that lack of systematic CKD-related knowledge and skills, incomplete incentive mechanisms for primary care medical staff, lack of smooth referral processes between primary care institutions and higher-level hospitals, and poor patient self-management abilities were the barriers in

monitoring and management of type 2 diabetes mellitus combined with CKD in community settings.

Conclusion General practitioners face barriers at different levels in monitoring and managing patients with type 2 diabetes mellitus combined with CKD. It is necessary to strengthen the training of relevant knowledge and skills for general practitioners, improve the incentive mechanisms in primary care medical and health institutions, establish effective referral processes between primary care institutions and higher-level hospitals, and enhance patient self-management abilities, thereby improving the prevention and treatment capacity of primary care medical and health institutions for type 2 diabetes mellitus combined with CKD.

Full Text

A Qualitative Study on Barriers to Monitoring and Management of Chronic Kidney Disease in Type 2 Diabetes from the Perspective of General Practitioners

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Abstract

Background: The prevalence of type 2 diabetes continues to rise in China, and general practitioners play a crucial role in preventing and treating type 2 diabetes and its complications. Chronic kidney disease (CKD) is a common comorbidity in diabetic patients, yet research evidence on comprehensive prevention and treatment of type 2 diabetes with CKD in primary care remains limited in China.

Objective: To identify barriers to monitoring and managing CKD in patients with type 2 diabetes in community settings from the perspective of general practitioners.

Methods: From May to July 2022, general practitioners were recruited from an urban district of Beijing using snowball sampling for one-on-one semi-structured interviews. An interview guide was developed based on the Theoretical Domains Framework (TDF). Interview content was coded and categorized using NVivo 11

software, and data were analyzed using thematic framework analysis to extract key themes.

Results: Thirteen general practitioners were interviewed, with 8–22 years of experience in general practice. The study identified barriers related to six domains of the TDF: knowledge/skills, beliefs about consequences, motivation and goals, environmental context and resources, and social influences. Further synthesis revealed that lack of systematic CKD-related knowledge and skills, inadequate incentive mechanisms for primary care staff, absence of smooth referral pathways between primary and higher-level hospitals, and poor patient self-management capacity were major obstacles to CKD monitoring and management in type 2 diabetes within community settings.

Conclusion: General practitioners face multi-level barriers in monitoring and managing patients with type 2 diabetes and CKD. Addressing these requires strengthening knowledge and skills training, improving incentive mechanisms in primary care institutions, establishing effective referral processes with higher-level hospitals, and enhancing patient self-management capabilities to improve prevention and treatment capacity for type 2 diabetes with CKD at the primary care level.

[Key words] Diabetes mellitus, type 2; Chronic kidney disease; Theoretical domains framework; Qualitative research; Barriers

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Background

With accelerated population aging and lifestyle changes in China, the prevalence of diabetes continues to rise, reaching 12.8% among adults aged $ 18 years in 2017 [1]. Chronic kidney disease (CKD), defined as glomerular filtration rate (GFR) < 60 ml · min^{-1}·(1.73 m^{2})^{-1}$ and/or kidney damage persisting for more than 3 months according to the National Kidney Foundation [3], is a common comorbidity in diabetic patients and a critical factor affecting prognosis and quality of life [2]. Diabetes with CKD encompasses diabetic kidney disease (DKD), non-diabetic kidney disease (NDKD), and their coexistence [4]. Diabetic patients face a 2.6-fold higher risk of developing CKD [5], while end-stage renal disease (ESRD) is associated with high disability and mortality rates [6]. A cross-sectional study of patients with type 2 diabetes in Shanghai found that 27.1% had CKD and 25.2% had albuminuria [7]. Conversely, a multicenter prospective cohort study of CKD patients in China showed that 18.1% had diabetes [8], highlighting that diabetes and CKD coexisting has become a major challenge in diabetes research and treatment in China [9-11].

Comprehensive management of type 2 diabetes with CKD requires attention to glycemic control, dyslipidemia, albuminuria, and diabetes care, with the ultimate goals of preventing disease progression, reducing complications, and improving quality of life [12]. Current guidelines recommend regular CKD screen-

ing and timely intervention in primary care to enable early identification and slow disease progression, thereby reducing healthcare burden [13-15]. Enhancing primary care management capacity and service quality is key to addressing the challenge of type 2 diabetes with CKD [13]. However, due to regional, age, educational, and experience differences, general practitioners' capacity for CKD prevention and treatment is uneven and requires overall improvement. A Shanghai survey on community general practitioners' knowledge and management of DKD showed an overall correct answer rate of 60.2% for DKD-related knowledge, with 74.3% reporting they screen diabetic patients for DKD [16]. Another Beijing study revealed low mastery of CKD knowledge among general practitioners, emphasizing the need for early community-based CKD management capacity building [17].

Currently, comprehensive prevention and treatment of type 2 diabetes with CKD in Chinese primary care institutions remains in the exploratory stage [18], with limited research evidence. This study aims to identify barriers to monitoring and managing CKD in community patients with type 2 diabetes through semi-structured interviews with general practitioners, providing references for improving primary care capacity.

1.1 Study Participants

From May to July 2022, 13 general practitioners from seven community health centers in an urban district of Beijing were recruited using snowball sampling. Inclusion criteria were: (1) $ 5 $ $ years of professional experience $; (2) $ managing a certain number of type 2 diabetes p $ (3) holding intermediate or higher professional titles; and (4) voluntary participation. Exclusion criteria were general practitioners who had not worked in general practice clinics for the past five years. Sample size determination was based on information saturation, defined as when no new important information emerged and no new codes or themes appeared during data analysis. This study was approved by the Capital Medical University Medical Ethics Committee (approval number: Z2023SY072). All participants provided informed consent and were informed that they would bear no risks or burdens from the study.

1.2.1 Interview Guide Development

Researchers developed the interview guide based on the study objectives and Theoretical Domains Framework (TDF). General practitioners were invited to review the guide and provide feedback. The TDF is widely used in qualitative research as it encompasses key factors influencing behavior change from psychological theories, helping researchers identify factors affecting behavior change at social, organizational, and individual levels [19]. Before formal interviews, two general practitioners participated in pilot interviews to test the guide. Based on pilot results, questions were adjusted to ensure comprehensiveness, depth, and clarity. The final interview guide is shown in Table 1 .

1.2.2 Data Collection

One-on-one semi-structured interviews were conducted with community general practitioners based on the interview guide using both online (WeChat video) and offline formats in independent medical offices, according to participants' preferences. Twelve interviews were conducted online and one offline. Two research team members interviewed each participant after explaining the purpose and obtaining consent for audio recording, emphasizing confidentiality. Interviewers adjusted question order and wording as needed, with interviews lasting 30–40 minutes.

1.2.3 Data Analysis

Audio recordings were transcribed into text within 24 hours after each interview and verified by participants. Two researchers independently read and initially coded the transcripts, then used NVivo 11 software to deductively categorize themes according to TDF domains and inductively analyze all transcript data. Disagreements were discussed with other team members to reach final decisions.

2.1 Basic Information of Interviewees

Thirteen community general practitioners were included (2 male, 11 female) with a mean age of 38.8$\pm$4.2$years. All held bachelor's degrees, with 10 attending physicians and 3 associate chief physi$ years. See Table 2 for details.

2.2 Interview Results

Analysis identified barriers across six TDF domains: knowledge/skills, beliefs about consequences, motivation and goals, environmental context and resources, and social influences, affecting community-based CKD monitoring and management in type 2 diabetes.

2.2.1 Knowledge/Skills (1) Lack of systematic CKD-related knowledge and skills. General practitioners reported insufficient and unsystematic CKD knowledge. Participant 1: "My CKD knowledge is average and unsystematic—just basic things like urine routine and kidney function tests. I know some hypoglycemic drugs like SGLT-2 inhibitors and antihypertensives like ARB/ACEI have kidney protective effects, but overall it's not comprehensive or systematic." Participant 9: "My CKD knowledge is quite average."

(2) Limited attention to diabetes-CKD guidelines. General practitioners paid little attention to diabetes-CKD guidelines. Participant 1: "Guidelines focus more on blood glucose, lipids, and cardiovascular disease; kidney disease gets less attention than cardiovascular disease." Participant 5: "I rarely learn about guidelines on diabetic nephropathy or CKD."

(3) Lack of CKD-specific training. CKD training was limited, mainly covered briefly in diabetes complication training. Participant 4: "CKD is only mentioned when diabetes training covers complications. Specific CKD training is lacking or nonexistent." Participant 6: "There's no CKD-related training, nor specific training on CKD in diabetic patients."

2.2.2 Beliefs About Consequences (1) Inadequate incentives. Current incentive mechanisms need improvement, with compensation not matching workload, affecting motivation. Participant 1: "The workload is too heavy, but income hasn't increased accordingly, affecting my enthusiasm." Participant 2: "Community incentives for this work are limited." Participant 6: "Increased chronic disease management workload without corresponding performance pay negatively affects work."

(2) Lack of confidence in CKD management. General practitioners lacked confidence in managing kidney complications in type 2 diabetes. Participant 9: "Not very confident; it feels overwhelming." Participant 11: "To be honest, no confidence." This stemmed from: lack of confidence in continuous CKD patient management—Participant 8: "I rarely manage a CKD patient from beginning to end. Without tracking their overall condition, I'm not confident about later-stage control." high patient volume with limited staff—Participant 11: "Our center has a special diabetes clinic with several diabetes care specialists who help track patients and remind them about check-ups. But for detailed management, one specialist can only handle 200 patients annually, leaving many unmanaged."

2.2.3 Motivation and Goals (1) Lack of systematic CKD management plans. General practitioners lacked planned approaches to CKD monitoring and management. Participant 1: "I mainly think about stages around CKD 3; after CKD 3b it's uncontrollable. I try to get patients to control blood pressure, glucose, and lipids early. If they reach CKD 3b, I refer them to specialists for detailed examination and medication guidance, then monitor regularly." Participant 2: "We lack systematic management plans or goals specifically for kidney complications."

(2) Insufficient priority. CKD monitoring and management received inadequate attention. Participant 4: "Primary care doctors may not manage as deeply as specialists. General practitioners focus on whole-course diabetes management, emphasizing blood glucose and medication. With complications like peripheral neuropathy besides kidney disease, we can't fully grasp detailed information on diabetic kidney disease since it's not our specialty." Participant 5: "Diabetes management currently focuses on blood glucose, with less attention and management of kidney complications."

2.2.4 Environmental Context and Resources Heavy workload and burden. General practitioners already face heavy workloads, making CKD monitoring and management additionally burdensome. Participant 1: "The

workload is definitely heavy. I do a lot in the special clinic and don't want more pressure." Participant 2: "Large outpatient volumes create heavy workloads and stress, leaving insufficient time and energy for comprehensive assessment and management." Participant 3: "Managing hypertension and diabetes while also targeting organ damage and complications—if every patient requires high-standard quality management, one's energy is limited."

2.2.5 Social Influences **(1) Need for specialist guidance.** General practitioners require expert guidance in managing type 2 diabetes with CKD. Participant 1: "Although we've established a diabetes special clinic, guidance from higher-level hospitals isn't well implemented." Participant 3: "We need effective connections with tertiary hospitals because diabetic kidney disease is complex. We need expert support for difficult cases."

(2) Lack of CKD monitoring project support. Some community health centers lack complete CKD monitoring projects for routine screening. Participant 2: "Communities need support for monitoring projects like urinary microalbumin and glycated hemoglobin." Participant 3: "We can test urinary microalbumin, urine creatinine ratio, and urine albumin, but can't do 24-hour urine albumin quantification. Some centers can't even perform these tests, limiting screening capabilities."

(3) Lack of CKD medication support. Some centers lack essential CKD treatment drugs. Participant 3: "Community CKD medications are too limited. We don't have creatinine-lowering drugs or many nephrology-related medications, restricting patient management." Some noted high costs—Participant 10: "Diabetic nephropathy medications are generally expensive compared to other drugs."

(4) Absence of smooth referral processes. Referral pathways are not systematic, relying on personal connections. Participant 3: "I once referred a patient who couldn't get an appointment, so I directly contacted the nephrology department head. This worked but isn't systematic—it's based on personal effort." Participant 4: "We can only suggest which hospital and department patients should choose, rather than implementing a referral plan. Appointment platforms exist but aren't smooth." Information access after referral is also limited—Participant 3: "There's no pathway for feedback from higher-level hospitals. I don't know the nephrology department's management plan; I only learn from patients."

2.2.6 Behavioral Regulation **(1) Lack of systematic work summaries.** Some general practitioners lacked systematic summaries of their work. Participant 1: "I rarely summarize my work. Without this habit, improvement is slow. Without many cases, I don't think to collect and summarize them." Participant 2: "I might have thoughts about some patients, especially in wards where we can summarize cases or hold discussions. For routine outpatient work, there's no summary."

(2) Insufficient health education. Due to busy schedules, health education for diabetic patients was inadequate. Participant 2: "Primary prevention health education is insufficient. Outpatient visits are too busy for long conversations." Participant 5: "More health education is needed, especially for newly diagnosed diabetic patients."

(3) Lack of standardized protocols. Unified protocols or pathways for management are lacking. Participant 3: "We need standardized models or pathways for diabetic kidney disease to ensure homogeneous management." Participant 5: "I generally ask patients to monitor proteinuria every half month to one month." Participant 11: "When we find abnormal kidney function, doctors might tell patients it could be diabetic nephropathy. But diagnosis actually requires 3–6 months, measuring urinary microalbumin or creatinine several times to confirm."

2.2.7 Patient Factors **(1) Poor patient compliance.** Some patients had poor follow-up compliance. Participant 2: "Some patients refuse visits, often sending younger relatives for medication pickup, showing weak initiative and poor compliance." Lifestyle compliance was also poor—Participant 2: "Guiding patients to change lifestyles—quitting smoking or drinking, exercise, diet—they still can't do it, especially diet control."

(2) Economic constraints. Patients' financial conditions affected treatment choices. Participant 2: "We want inexpensive yet effective medications, but it's hard. Cheap drugs may harm liver/kidney function, creating a dilemma." Participant 5: "Cost issues also negatively affect patients."

(3) Varying health literacy. Different health literacy levels affected disease awareness and prioritization. Participant 2: "Patients' education level and cognition greatly impact management. Elderly patients with hearing loss are difficult to communicate with. If families don't cooperate actively, controlling blood glucose is hard." Participant 6: "If patients themselves, as internal factors, don't prioritize this—thinking it doesn't affect their quality of life or they've had the disease too long to care—it hinders treatment."

CKD has become a global public health issue [20]. Epidemiological surveys of different communities show CKD prevalence rates of 18.7%, 11.8%, and 10.1% in Beijing, Shanghai, and Guangzhou respectively [21-23]. With increasing type 2 diabetes prevalence, diabetes has become a major cause of CKD. Clinical data from the past two decades in China show a rising proportion of diabetes-related CKD among ESRD causes [24]. General practitioners have advantages in preventing and treating type 2 diabetes with CKD through early detection, long-term follow-up, comprehensive risk factor intervention, and coordinated referrals [13]. However, this study's semi-structured interviews revealed that general practitioners face multi-level barriers in community-based monitoring and management, involving 15 factors across six TDF domains, including lack of

systematic knowledge and skills, limited guideline awareness, imperfect incentive mechanisms, lack of confidence, and poor referral processes. Targeted measures are needed to improve monitoring and management capacity.

As a national basic public health service, type 2 diabetes has a well-established community-based three-tier prevention system. Through years of training and practice, general practitioners have good mastery of diabetes-related knowledge and skills [25]. However, with the gradual implementation of the tiered diagnosis and treatment system, higher demands are placed on diabetes management. Clinical studies confirm that early intervention for diabetic nephropathy is effective—strict glycemic and blood pressure control can reduce incidence and slow progression [26]. General practitioners should address CKD prevention while managing diabetes. Previous Beijing and Shanghai studies showed insufficient CKD knowledge among general practitioners [17,27]. This study found that lack of CKD knowledge and skills, limited guideline awareness, and inadequate training hinder CKD monitoring and management, while standardized prevention guidelines for primary care need improvement. Existing community diabetes prevention training and guidelines should integrate diabetes-CKD content, specifying monitoring items, frequency, and intervention processes to facilitate community-based management [28]. Strengthening training and developing primary care CKD guidelines would better equip general practitioners.

3.2 Improving Incentive Mechanisms for Primary Care Staff

Although China's primary care performance evaluation system is gradually improving and the "two allowances" policy has increased incentives [29], current evaluation mainly focuses on basic public health services with insufficient incentives for clinical disease management. Increased workload without corresponding incentives affects motivation. This study shows that imperfect incentive mechanisms, heavy workloads, and burdens reduce general practitioners' enthusiasm [30]. As the main battlefield for chronic disease control, communities should emphasize intrinsic work motivation by increasing training opportunities and quality, reducing burden, increasing resource investment, minimizing policy constraints, and improving performance management to reshape primary care staff's work cognition and enhance motivation and performance [31]. This would improve work enthusiasm, implement family doctor contract services, and enable continuous patient management for early CKD detection, risk factor control, and timely intervention to improve prognosis [32].

3.3 Improving Referral Processes and Information Sharing Between Primary and Higher-Level Hospitals

This study found that expert guidance mechanisms are imperfect and referral pathways between community and higher-level hospitals are not smooth, affecting CKD patient management. Without effective medical information sharing between community and higher-level hospitals, medical information loops cannot be formed, particularly preventing community doctors from directly,

quickly, and accurately obtaining diagnoses and treatment plans from specialist visits, hindering continuous disease management [33]. Hospital-community integrated management can improve renal function, maximize quality of life and self-management, and reduce negative emotions [34]. Therefore, referral processes and policy implementation between community and higher-level hospitals within medical alliances need improvement, with integrated management guidelines clarifying responsibilities at each level.

3.4 Improving Patient Health Literacy and Promoting Self-Management

Studies show community residents lack CKD-related knowledge, hindering prevention and control. Community health centers should strengthen health education, including basic diabetes-CKD knowledge, lifestyle education on diet and exercise, and individualized treatment goals to mobilize patients' initiative, improve compliance and self-management, and improve prognosis [35].

In summary, as health "gatekeepers," general practitioners play important roles in monitoring and managing type 2 diabetes with CKD. This study identified multi-level barriers that may constrain effective monitoring and management. Capacity should be improved through knowledge and skills training, incentive mechanisms, referral processes, information sharing, and patient health education.

Limitations: As an exploratory study, all interviewees were from community health centers in one Beijing district, resulting in strong information homogeneity that may limit generalizability.

Author Contributions: YANG Haiyan and JIN Guanghui conceived and designed the study; JIN Guanghui and LU Xiaoqin conducted feasibility analysis; YANG Haiyan and LI Ting collected and analyzed data, performed statistical analysis, interpreted results, and drafted the manuscript; JIN Guanghui revised the manuscript and was responsible for quality control; JIN Guanghui and LU Xiaoqin had overall responsibility for the article.

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References

[1] LI Y Z, TENG D, SHI X G, et al. Prevalence of diabetes recorded in mainland China using 2018 diagnostic criteria from the American Diabetes Association: national cross sectional study[J]. BMJ, 2020, 369: m997. DOI: 10.1136/bmj.m997.

[2] KOYE D N, MAGLIANO D J, NELSON R G, et al. The global epidemiology of diabetes and kidney disease[J]. Adv Chronic Kidney Dis, 2018, 25(2): 121-132. DOI: 10.1053/j.ackd.2017.10.011.

[3] Kidney Disease: Improving Global Outcomes Diabetes Work Group. KDIGO 2020 clinical practice guideline for diabetes management in chronic kidney disease[J]. Kidney Int, 2020, 98(s4): s1-s115. DOI: 10.1016/j.kint.2020.06.019.

[4] ANDERS H J, HUBER T B, ISERMANN B, et al. CKD in diabetes: diabetic kidney disease versus nondiabetic kidney disease[J]. Nat Rev Nephrol, 2018, 14(6): 361-377. DOI: 10.1038/s41581-018-0001-y.

[5] FOX C S, LARSON M G, LEIP E P, et al. Predictors of new-onset kidney disease in a community-based population[J]. JAMA, 2004, 291(7): 844-850. DOI: 10.1001/jama.291.7.844.

[6] ZHANG L X, WANG F, WANG L, et al. Prevalence of chronic kidney disease in China: a cross-sectional survey[J]. Lancet, 2012, 379(9818): 815-822. DOI: 10.1016/S0140-6736(12)60033-6.

[7] GUO K F, ZHANG L, ZHAO F Y, et al. Prevalence of chronic kidney disease and associated factors in Chinese individuals with type 2 diabetes: cross-sectional study[J]. J Diabetes Complications, 2016, 30(5): 803-810. DOI: 10.1016/j.jdiacomp.2016.03.020.

[8] ZHANG J J, YANG L, HUANG J W, et al. Characteristics and comparison between diabetes mellitus and non-diabetes mellitus among chronic kidney disease patients: a cross-sectional study of the Chinese Cohort Study of Chronic Kidney Disease (C-STRIDE)[J]. Oncotarget, 2017, 8(63): 106324-106332. DOI: 10.18632/oncotarget.22368.

[9] DIAMANTIDIS C J, POWE N R, JAAR B G, et al. Primary care-specialist collaboration in the care of patients with chronic kidney disease[J]. Clin J Am Soc Nephrol, 2011, 6(2): 334-343. DOI: 10.2215/CJN.06240710.

[10] LO C, ILIC D, TEEDE H, et al. Primary and tertiary health professionals' views on the health-care of patients with co-morbid diabetes and chronic kidney disease: a qualitative study[J]. BMC Nephrol, 2016, 17(1): 50. DOI: 10.1186/s12882-016-0245-9.

[11] NIHAT A, LUSIGNAN S D, THOMAS N, et al. What drives quality improvement in chronic kidney disease (CKD) in primary care: process evaluation of the Quality Improvement in Chronic Kidney Disease (QICKD) trial[J]. BMJ Open, 2016, 6(4): e008480. DOI: 10.1136/bmjopen-2015-008480.

[12] MOTTL A K, ALICIC R, ARGYROPOULOS C, et al. KDOQI US commentary on the KDIGO 2020 clinical practice guideline for diabetes management in CKD[J]. Am J Kidney Dis, 2022, 79(4): 457-479. DOI: 10.1053/j.ajkd.2021.09.010.

[13] GRILL A K, BRIMBLE S. Approach to the detection and management of chronic kidney disease: what primary care providers need to know[J]. Can Fam Physician, 2018, 64(10): 728-735.

[14] VASSALOTTI J A, CENTOR R, TURNER B J, et al. Practical approach

to detection and management of chronic kidney disease for the primary care clinician[J]. Am J Med, 2016, 129(2): 153-162. DOI: 10.1016/j.amjmed.2015.08.025.

[15] MURPHREE D, THELEN S M. Chronic kidney disease in primary care[J]. J Am Board Fam Med, 2010, 23: 542-550. DOI: 10.3122/jabfm.2010.04.090129.

[16] YANG H, XIA H L, REN L M, et al. Survey on knowledge and management ability of diabetic kidney disease among community general practitioners in Shanghai[J]. Chin J Gen Pract, 2017, 16(12): 917-920. DOI: 10.3760/cma.j.issn.1671-7368.2017.12.004.

[17] NIU N, DONG J Q, DU X P. Survey on chronic kidney disease cognition among grassroots general practitioners in Beijing[J]. Chin Gen Pract, 2017, 20(10): 1267-1270. DOI: 10.3969/j.issn.1007-9572.2017.10.025.

[18] NING J, WU Y P, LI Y F. Current status and exploration of community management of diabetic kidney disease in China[J]. Chin Gen Pract, 2019, 22(4): 402-406. DOI: 10.12114/j.issn.1007-9572.2019.04.007.

[19] HUA W Z, LIU S S, ZHU D Q. Development and application progress of the Theoretical Domains Framework[J]. Chin Nurs Res, 2016, 30(18): 2177-2179. DOI: 10.3969/j.issn.1009-6493.2016.18.001.

[20] EL NAHAS A M, BELLO A K. Chronic kidney disease: the global challenge[J]. Lancet, 2005, 365(9456): 331-340. DOI: 10.1016/S0140-6736(05)17789-7.

[21] ZHANG L X, ZUO L, XU G B, et al. Epidemiological study of chronic kidney disease in middle-aged and elderly population in Shijingshan District, Beijing[J]. Chin J Nephrol, 2006, 22(2): 139-143. DOI: 10.3760/j.issn:1001-7097.2006.02.003.

[22] HUANG Y P, WANG W M, PEI D L, et al. Epidemiological study of chronic kidney disease in adult urban community population in Shanghai[J]. Chin J Nephrol, 2008, 24(12): 872-877. DOI: 10.3321/j.issn:1001-7097.2008.12.004.

[23] CHEN W, WANG H, DONG X Q, et al. Epidemiological study of chronic kidney disease in general urban population in Guangzhou[J]. Chin J Nephrol, 2007, 23(3): 147-151. DOI: 10.3760/j.issn:1001-7097.2007.03.004.

[24] ZHANG L X, LONG J Y, JIANG W S, et al. Trends in chronic kidney disease in China[J]. N Engl J Med, 2016, 375(9): 905-906. DOI: 10.1056/NEJMc1602469.

[25] Chinese Diabetes Society, National Office for Primary Diabetes Care. National guidelines for primary diabetes care (2022)[J]. Chin J Intern Med, 2022, 61(3): 249-262. DOI: 10.3760/cma.j.cn112138-20211206-00827.

[26] ZHANG S J. Treatment of chronic kidney disease with diabetes[J]. Clin Focus, 2016, 31(6): 631-635. DOI: 10.3969/j.issn.1004-583X.2016.06.011.

[27] WU L Y, XIE J F. Study on chronic kidney disease knowledge and countermeasures among family doctor teams in Shanghai suburbs[J]. Chin J Gen Pract, 2018, 16(7): 1154-1157. DOI: 10.16766/j.cnki.issn.1674-4152.000318.

[28] ZHANG L X, WANG H Y. Discussion on the epidemiological trends and countermeasures of diabetic nephropathy in China[J]. Chin J Intern Med, 2010, 49(9): 804-805. DOI: 10.3760/cma.j.issn.0578-1426.2010.09.026.

[29] General Office of the State Council. Opinions on reforming and improving the training and incentive mechanisms for general practitioners[A/OL]. (2018-01-24)[2023-01-02]. https://www.gov.cn/zhengce/content/2018-01/24/content_{5260073}.htm.

[30] CHEN C, ZHAO Y L, LIU Y L, et al. Study on work status and influencing factors of general practitioners in rural Beijing[J]. China Med Herald, 2015, 12(5): 133-136.

[31] ZHAO S C, PING J, ZHU H, et al. Research on intrinsic incentive mechanism of primary health workers from the perspective of job characteristics model[J]. Chin Gen Pract, 2023, 26(25): 3118-3126. DOI: 10.12114/j.issn.1007-9572.2022.0642.

[32] Shanghai Kidney Disease Clinical Quality Control Center Expert Group, MEI C L, GAO X, et al. Guidelines for early screening, diagnosis, prevention and treatment of chronic kidney disease (2022 edition)[J]. Chin J Nephrol, 2022, 38(5): 453-464. DOI: 10.3760/cma.j.cn441217-20210819-00067.

[33] XU L Y, HUI M, ZHENG X Z, et al. Current status and strategies of primary prevention of diabetic kidney disease in China[J]. Chin J Gen Pract, 2023, 22(2): 110-114. DOI: 10.3760/cma.j.cn114798-20220507-00393.

[34] ZHANG H, LUO Y, LI X Q, et al. Impact analysis of hospital-community integrated management on chronic kidney disease intervention[J]. China Med, 2020, 15(6): 919-922. DOI: 10.3760/j.issn.1673-4777.2020.06.028.

[35] TIAN B, JIANG R S, ZHOU M, et al. Survey on chronic kidney disease knowledge among urban community residents in Kunming[J]. Chin J Dis Control Prev, 2017, 21(9): 963-965. DOI: 10.16462/j.cnki.zhjbkz.2017.09.026.

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