Postprint: Health Management Service Pathways for Community-Dwelling Elderly with Multimorbidity

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Abstract

Multimorbidity has become a significant characteristic in the progression of chronic diseases, posing severe health risks to middle-aged and older adults and presenting novel challenges for chronic disease health management. Current chronic disease management practices in China lack specific guidance and intervention protocols for multimorbidity. This study initially formulated a service pathway through literature review and focus group discussions. Subsequently, expert consultation was employed to evaluate and refine the constructed service pathway, ultimately developing a community-based health management service pathway for multimorbidity in middle-aged and older adults centered on behavior change techniques. This pathway optimizes the implementation entities, service processes—including health monitoring, assessment, and intervention components—of multimorbidity health management, thereby providing theoretical and practical guidance for healthcare personnel in primary healthcare institutions to deliver multimorbidity health management services.

Full Text

Study on the Health Management Service Pathway for Multimorbidity of Middle-aged and Older Adults in the Community

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Abstract

Multimorbidity has become a defining characteristic of chronic disease development, posing serious threats to the health of middle-aged and older adults while presenting new challenges for chronic disease health management. Current chronic disease management practices in China lack guidelines and intervention protocols specifically for multimorbidity. This study initially formulated a health management service pathway for multimorbidity among community-dwelling middle-aged and older adults through literature review and focus group discussions. Building upon this foundation, the constructed service pathway was evaluated and revised via expert consultation, ultimately resulting in a community-based multimorbidity health management service pathway centered on behavioral change techniques. This pathway optimizes the implementation entities for multimorbidity health management and standardizes service procedures, including health monitoring, assessment, and intervention components, thereby providing theoretical and practical guidance for primary healthcare providers engaged in multimorbidity health management.

Keywords: Multimorbidity; Community; Health management; Service pathway; Aged

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1 Current Status of Chronic Disease Health Management Research

The Chinese Communist Party Central Committee and the State Council have attached great importance to chronic disease prevention and control. Both the 13th Five-Year Plan for National Economic and Social Development and the "Healthy China 2030" Planning Outline have proposed the strategic task of

"implementing comprehensive chronic disease prevention and control" and established the development goal of "reducing premature mortality from major chronic diseases" [1]. With increasing human longevity, multimorbidity has emerged as a key characteristic of chronic disease development [2]. Research indicates that among Chinese residents with chronic diseases, 46.5% suffer from multimorbidity [3]. Multiple chronic conditions in the same individual often share common risk factors, enabling integrated management. Chinese scholars have proposed various health management strategies and models for different chronic diseases and settings [4-5], yet research specifically targeting multimorbidity health management remains lacking. Therefore, in chronic disease prevention and control efforts, attention should be paid to the cumulative effects of multimorbidity, integrating key management components across multiple chronic conditions to formulate multimorbidity health management strategies.

1.1 International Research Status

Currently, research on chronic disease health management strategy development and model construction has matured both domestically and internationally, with relevant attempts made for different settings and chronic disease types. In 2016, the UK' s National Institute for Health and Care Excellence (NICE) published guidelines on multimorbidity management titled "Multimorbidity: Clinical Assessment and Management" [6], which established fundamental principles and procedures for multimorbidity care. Several scholars have also attempted to construct multimorbidity health management models. For instance, KANGOVI et al. [7] proposed a community health worker-based health management program, demonstrating its effectiveness in improving chronic disease status, mental health, and quality of care for multimorbidity patients. CROWE et al. [8] evaluated the clinical effects of transdiagnostic health management interventions on elderly patients with multimorbidity. Although these studies were small-scale trials, they provided valuable references for multimorbidity health management.

Additional research has focused on diagnosis, treatment, and care for multimorbidity patients, particularly concerning polypharmacy. A seminal study by PALMER et al. [9] in 2018 proposed a multimorbidity care model comprising five components with 16 specific measures: delivery system design, decision support, self-management support, clinical information systems, and community resources. BOYD et al. [10] developed a multimorbidity action framework to guide clinicians in making different care decisions for patients with varying needs. TANG et al. [11] utilized a two-round Delphi method to identify seven key intervention elements and 23 behavior change technique-based expert consensus items for pharmacotherapy in Singaporean multimorbidity patients.

Furthermore, intervention studies have examined health outcomes in multimorbidity patients. SMITH et al. [12] conducted a meta-analysis of 17 relevant intervention studies to formulate policies for managing multimorbidity patients in primary care and community settings. The study noted that across 11 ran-

domized controlled trials, the primary intervention factor was organizational change in multimorbidity care delivery, typically implemented through case management or enhanced multidisciplinary teamwork. In the remaining six studies, interventions were primarily patient-oriented, such as directly providing education or self-management support to participants. SINNOTT et al. [13] developed a novel intervention design approach known as the Behaviour Change Wheel and subsequently identified intervention measures for medication management in multimorbidity patients.

1.2 Domestic Research Status

Various regions in China have developed distinctive chronic disease health management models. These include Xiamen's "Three-Professionals Co-management" model [4], where family doctor teams composed of physicians, pharmacists, and nurses jointly manage chronic diseases; Beijing' s Changping model [5]; and Shanghai' s Jing' an Traditional Chinese Medicine model [14]. All represent effective attempts at chronic disease health management. Additionally, scholars have developed and applied health management models for specific chronic diseases. For example, Bao Yong proposed the "4CH8" health management model and applied it to patients with hypertension [15] and diabetes [16]. Zhou Zhiheng et al. [17] explored an "Internet Plus" diabetes tripartite co-management health model. Our research team previously proposed the "SMG" health management model [18-19], comprising three levels of management—self, mutual assistance, and group—which has also been applied by relevant scholars in chronic disease management with certain effectiveness. Analysis of existing research reveals that China has yet to establish mature multimorbidity health management models and service pathways.

2 Construction of a Community Multimorbidity Health Management Service Pathway

Literature Research Method: This study first employed literature research methods, utilizing CiteSpace software to systematically review literature on multimorbidity health management [20], identifying behavioral change as the core management component.

Focus Group Discussion Method: We convened 14 researchers in this field, including 5 professors, associate professors, and lecturers, along with 9 doctoral and master' s students, to form a research team. Through focus group discussions, we preliminarily developed a community-based multimorbidity health management service pathway for middle-aged and older adults, incorporating nine major intervention functions derived from the Behaviour Change Wheel (BCW) theory [21] that can constitute a comprehensive intervention framework.

Expert Consultation Method: Twenty-two experts were selected for consultation to evaluate the feasibility and revise the content of the constructed service pathway. Expert selection criteria included: (1) holding intermediate

professional titles or middle-level leadership positions or above; (2) possessing at least five years of work experience or research engagement in chronic disease prevention and control or related fields; and (3) demonstrating adequate motivation and voluntary participation. All selected experts were over 30 years old with bachelor' s degrees or higher; 68.2% were female, and 72.7% had worked in the field for ten years or more. This process ultimately yielded a multimorbidity health management service pathway suitable for practice by community health management personnel.

This service pathway provides a reference paradigm for improving health management efficiency for chronic disease patients in communities, strengthening multimorbidity prevention and control, and enhancing health resource utilization. The specific pathway content is detailed below.

2.1 Implementation Entities for Health Management Services

In multimorbidity health management, a tripartite integrated prevention and control collaboration network should be established, encompassing macro-level policy guidance, meso-level technical support, and micro-level grassroots implementation.

2.1.1 Macro-Level Policy Guidance Health administrative departments must enhance their emphasis on multimorbidity health management and exert macro-regulatory functions. Multimorbidity health management can be incorporated into the performance evaluation content of essential public health service projects to increase grassroots attention and create a favorable policy support environment. Simultaneously, health departments should collaborate with civil affairs departments, human resources and social security departments, and other relevant agencies to jointly issue multimorbidity health management task requirements.

2.1.2 Meso-Level Technical Support A multidisciplinary integrated team comprising clinical professionals, public health specialists, health management practitioners, and researchers in related fields should be assembled to provide theoretical guidance and technical support for multimorbidity health management. Multidisciplinary integration can comprehensively address issues such as the complex etiology of multimorbidity and insufficient management experience.

2.1.3 Micro-Level Grassroots Implementation Communities represent the optimal setting for health management of multimorbidity in middle-aged and older adults. Primary healthcare institution staff, medical-nursing integration institution personnel, and community volunteers constitute the main implementers of multimorbidity health management for this population. Primary healthcare workers serve as the first line of defense for the health of middle-aged and older adults, possessing the most intimate knowledge of their health status. Therefore, implementing multimorbidity health management through

village doctors, general practitioners at community health service centers, and public health service personnel can achieve optimal results.

2.2 Health Management Service Process

This service pathway primarily targets community-dwelling middle-aged and older adults. The specific service process is as follows.

2.2.1 Health Information Collection and Monitoring Health information collection and monitoring should encompass two components: physical examination data and health behavior survey data. Physical examination data reveal the prevalence of multimorbidity in the population, while health behavior survey data screen for multimorbidity risk factors.

The organization and management of health information collection and monitoring are the responsibility of grassroots departments (sections) at all levels of health administrative agencies, with implementation institutions including village clinics, township health centers, and community health service centers (stations). Primary healthcare institutions should integrate population health information collection and monitoring into essential public health service work to comprehensively grasp the health information of residents within their jurisdiction.

Specific information collected includes: (1) Establishing health records: Based on essential public health services and family doctor contract services, health records should be perfected to create continuous, longitudinal health information tracking. (2) Regular follow-up and surveys: Face-to-face interviews should be conducted every 6-12 months to understand the current health status, behavioral issues, and other risk factors of community populations, with detailed records maintained. (3) Regular behavioral observation: During interviews and surveys, naturalistic observation of population behaviors should be performed to understand discrepancies between self-reported and actual behaviors and identify key unhealthy behaviors.

The content of health information collection and monitoring is illustrated in Figure 1 [Figure 1: see original paper].

2.2.2 Multimorbidity Risk and Health Assessment Primary healthcare institutions should establish robust multimorbidity management systems, with staff from village clinics, township health centers, and community health service centers (stations) conducting multimorbidity risk assessment and screening based on population health examination data, health behavior surveys, and observational data.

Risk assessment represents a critical technical component of the health management process and the first step in multimorbidity prevention. It involves analyzing personal health information to establish quantitative relationships

between lifestyle, environmental risk factors, and multimorbidity, thereby predicting an individual's likelihood of developing multimorbidity within a specified timeframe and enabling targeted prevention and intervention according to population needs.

Variables to be included in this assessment tool comprise age, gender, education level, marital status, presence of a single chronic condition, sleep duration, physical exercise time and frequency, smoking status, alcohol consumption, and emotional state. This risk assessment tool enables quantitative evaluation of multimorbidity risk among older adults, facilitating the identification of low-, moderate-, and high-risk populations for precision management in practice.

2.2.3 Risk-Stratified Intervention for Multimorbidity Different populations exhibit varying levels of multimorbidity risk, and groups at different risk levels face distinct challenges. Therefore, based on health information collection and monitoring, individuals' multimorbidity risk should be assessed and classified into low-risk, moderate-risk, and high-risk categories for targeted intervention. The community multimorbidity risk-stratified intervention process is illustrated in Figure 2 [Figure 2: see original paper].

(1) **Risk level assessment and stratification**: Comprehensive health information collection should be conducted for community populations, and a multimorbidity risk assessment tool [22] should be employed to stratify multimorbidity risk levels.

(2) **Identifying modifiable risk factors**: Risk factors specific to low-, moderate-, and high-risk populations should be identified, and concrete health problems amenable to intervention should be proposed for each group to establish a foundation for developing targeted intervention protocols.

(3) **Developing intervention objectives and protocols**: Personalized intervention objectives should be formulated based on risk stratification and health problems among different risk-level groups. The multidisciplinary health management team assembled at the project' s inception should develop intervention protocols that are feasible, acceptable, and cost-effective according to the characteristics of multimorbidity. Intervention protocols can be composed of appropriate intervention functions, as detailed in Table 1 .

(4) **Implementing intervention protocols**: Community interventions should be conducted according to the developed risk-level-specific protocols, employing tiered management with priority given to high-risk populations. Both group and personalized interventions should be delivered to high-risk populations, while group interventions can be implemented for moderate- and low-risk populations when resources permit. Primary healthcare institution staff bear primary responsibility for multimorbidity intervention work, and family members and friends of

middle-aged and older adults should be encouraged to participate in risk management for at-risk populations.

(5) **Evaluating intervention effectiveness**: Health information should be recorded regularly. High-risk populations should attend follow-up visits at relevant primary healthcare institutions every 3-6 months, while moderate- and low-risk populations can be followed up every 6-12 months. Relevant physical examination and behavioral data should be completed, including physical measurements (e.g., body weight, waist circumference, blood pressure), laboratory tests (fasting blood glucose, liver function, kidney function, lipid panel), psychological assessments, and behavioral measurements (physical exercise, diet, smoking, alcohol consumption) to evaluate community intervention effectiveness.

(6) **Adjusting intervention objectives and protocols**: Based on gaps between intervention effectiveness and objectives, as well as problems encountered during protocol implementation, protocol details should be promptly adjusted to improve intervention outcomes.

(7) **Establishing a closed-loop management cycle of implementation-evaluation-adjustment-implementation**: Repeating the intervention implementation-evaluation-adjustment-implementation cycle creates a dynamic multimorbidity risk management system.

The multimorbidity health management service pathway is illustrated in Figure 3 [Figure 3: see original paper].

Table 1 Suggestions for the Use of Intervention Functions

Incentivization: Implement varied material or economic reward measures for different risk-level populations to promote health management behaviors for multimorbidity among middle-aged and older adults. Create and establish a series of reward systems to enhance staff execution of health management work.

Environmental Restructuring: Modify existing social, material, and spatial community environments to provide adequate space and resources, ensuring safe and appropriate multimorbidity health management for middle-aged and older adults.

Enablement: Enhance the health management capabilities of both community staff and middle-aged and older adults.

Education: Increase older adults' knowledge about multimorbidity through health education programs.

Training: Improve middle-aged and older adults' capacity for self-health management and equip them with relevant management skills through training. Conduct training for staff to help them master basic health management procedures.

Restriction: Establish rules to limit unhealthy behaviors among intervention targets, such as regular self-monitoring of blood pressure and blood glucose and

adherence to medication schedules.

Coercion: Health management requires high levels of subjective initiative and cooperation from middle-aged and older adults; however, in practice, individuals cannot be forced to accept health management services (thus not recommended as an intervention approach).

Persuasion: Typically used in conjunction with education, but unlike education, persuasion lacks scientific guidance.

Modeling: Establish role models, such as selecting middle-aged and older adults with the best health management implementation as exemplary individuals, and recognizing outstanding multimorbidity health management staff.

2.2.4 Effectiveness Evaluation of Multimorbidity Health Management

After receiving community multimorbidity health management services, populations require regular health management effectiveness evaluation. High-risk populations should undergo systematic health management effectiveness assessment every 3-6 months, while moderate- and low-risk populations should be assessed every 6-12 months.

Evaluation content primarily includes assessment of multimorbidity status, health behavior evaluation, and other health outcome assessments such as quality of life and psychological status. Improvement in these indicators is considered indicative of effective health management.

Discussion

The prevalence of multimorbidity increases with age and creates greater mortality and disease burden. Risk screening and health management targeted at multimorbidity can help reduce its prevalence and decrease mortality risk and disease burden. China currently lacks health management guidelines or service pathways for multimorbidity. Existing chronic disease guidelines primarily focus on clinical aspects, serving to standardize diagnostic and treatment techniques or medication management for primary healthcare providers [23]. This study attempts to construct a community-based multimorbidity health management service pathway for China. Compared with existing research, this constructed pathway clarifies relevant definitions and implementation entities for multimorbidity health management, optimizes risk assessment, and standardizes monitoring, evaluation, and intervention processes, thereby providing scientific guidance for implementing community multimorbidity health management. Unlike other chronic disease management guidelines, this constructed pathway not only standardizes the multimorbidity health management process but also proposes nine intervention functions based on BCW theory. Community multimorbidity health management implementers can use this pathway to assess multimorbidity risk in community populations and conduct precision health management according to risk classification. Additionally, implementers can select appropriate intervention functions based on population multimorbidity risk and specific

modifiable factors, and design intervention protocols by combining suitable behavior change techniques according to the practical challenges encountered in behavioral change and multimorbidity risk intervention among middle-aged and older adults. Consequently, unlike the specific multimorbidity health management program proposed by KANGOVI et al. [7], this study only presents a reference intervention process for implementers without developing concrete intervention protocols, which require further refinement for practical application.

The community multimorbidity health management service pathway constructed in this study is applicable to community-dwelling middle-aged and older adults, with primary users being health management practitioners and institutions. The management focuses on controllable risk factors for multimorbidity, particularly behavioral factors. This pathway does not construct specific intervention protocols but rather clarifies service process specifications that align with health management theory and practice requirements, while also proposing intervention techniques that can be flexibly combined and adapted. Primary healthcare institution staff can use this framework to develop multimorbidity health management programs, creating precision intervention protocols that are both universally applicable and uniquely tailored to local characteristics, thereby achieving classified guidance and intervention for multimorbidity.

Author Contributions: Zhang Chichen and Zheng Xiao conceived and designed the study; Xue Benli and Chen Yimin collected literature and data; Li Xinru and Xiao Shujuan organized literature and data; Zheng Xiao drafted the manuscript; Zheng Xiao and Tian Feng revised the paper; Zheng Xiao and Xue Benli were responsible for quality control and review; Zhang Chichen and Tian Feng provided overall supervision and management.

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Figure Captions:

Figure 1 [Figure 1: see original paper]: Health Information Collection and Monitoring Content
Figure 2 [Figure 2: see original paper]: Closed-Loop Management Process of Multimorbidity Risk Interventions
Figure 3 [Figure 3: see original paper]: Community Multimorbidity Health Management Service Pathway

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