

General Practitioners Prescribing Medical Exercise Prescriptions to Promote Sports-Medicine Integration: Post-Print

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Abstract

The “Healthy China 2030” Planning Outline explicitly proposes establishing an exercise prescription database to promote the integration of sports and medicine, thereby leveraging the role of scientific fitness in chronic disease prevention and rehabilitation. However, the role that general practitioners in primary health-care institutions should play in prescribing medical exercise prescriptions for patients remains under exploration. Based on the current status of exercise prescription implementation both domestically and internationally, this study primarily employs literature search and data collection methods, supplemented by expert consultation and field investigation, to explore the responsibilities and importance of general practitioners in the application of medical exercise prescriptions, summarize existing deficiencies, and propose corresponding recommendations to facilitate integrated development of sports and medicine at the community level.

Full Text

Preamble

General Practitioners Prescribing Medical Exercise to Promote the Integration of Sports and Medicine

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Abstract The “Healthy China 2030” initiative explicitly proposes establishing an exercise prescription library to promote the integration of sports and medicine, leveraging scientific fitness in chronic disease prevention and rehabilitation. However, the role of general practitioners (GPs) in primary care institutions in prescribing medical exercise to patients remains under exploration. Based on the current status of exercise prescription implementation domestically and internationally, this study primarily employs literature review and data collection methods, supplemented by expert consultation and field research, to explore the responsibilities and importance of GPs in applying medical exercise prescriptions, summarize existing deficiencies, and propose recommendations to foster integrated community sports-medicine development.

[Key words] Integration of physical and medical care; Medical exercise prescription; Community; Chronic disease; General practitioner

Industrialization has dramatically transformed lifestyles, making sedentary behavior ubiquitous. Physical inactivity and insufficient activity represent risk factors for numerous chronic diseases, imposing a substantial global burden [1]. China’s “Healthy China 2030” initiative [2] explicitly calls for establishing an exercise prescription library to advance sports-medicine integration and harness scientific fitness for chronic disease prevention and rehabilitation. As the first line of defense in chronic disease management, primary care institutions and their GPs should fulfill their role as “health gatekeepers” by prescribing medical exercise for patients, conducting multi-sectoral collaboration, and guiding and monitoring residents’ scientific exercise to actively promote community sports-medicine integration. However, current domestic literature on community-based sports-medicine integration lacks systematic discussion of GPs’ specific roles. Through literature review, data collection, expert consultation, and site visits, this study summarizes the development status of exercise prescriptions worldwide to explore the tasks and responsibilities GPs should undertake in implementing community-based medical exercise prescriptions in China, thereby proposing recommendations to advance integrated community development.

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1. Development of Exercise Prescription Under the Sports-Medicine Integration Background

The term “exercise prescription” was first proposed by American physiologist Karpovich and introduced to China in the late 1970s. The 10th edition of the *ACSM's Guidelines for Exercise Testing and Prescription* [3] outlines the FITT-VP principle for exercise prescription development: Frequency, Intensity, Time, Type, Volume, and Progression. The *Chinese Expert Consensus on Exercise Prescription (2023)* [4] defines it as: a personalized, proactive exercise guidance program for health promotion and disease prevention, formulated by qualified exercise prescription technicians based on the recipient's basic health information, physical activity level, medical examination and diagnosis, exercise risk screening, and exercise testing results. It specifies exercise modality, frequency, intensity, duration, weekly volume, progression, and precautions, integrating local and holistic approaches with short- and long-term goals. The consensus categorizes exercise prescriptions into fitness prescriptions for health promotion and medical prescriptions for chronic disease management. The sports-medicine integration concept originated in the United States, with Chinese scholars discussing how to organically combine sports and healthcare for national health since the early 21st century. The U.S. launched the Exercise is Medicine (EIM) initiative in 2007, advocating that physicians and health professionals prescribe exercise in routine patient care [5]. China joined EIM in 2012, and related theoretical research has since flourished under national policy support. For instance, the *China Chronic Disease Prevention and Control Medium- and Long-Term Plan (2017-2025)* proposed “promoting sports-medicine integration and establishing exercise guidance clinics in qualified institutions.” As chronic disease prevention work has gradually shifted to communities, scholars have explored community-based sports-medicine integration from a supply-side reform perspective, concluding that its implementation is feasible and holds significant practical meaning for Healthy China construction [6]. Exercise prescription serves as the primary vehicle and tool throughout this integration process.

2.1 Theoretical and Scientific Research Developments in Exercise Prescription

Since its inception, exercise prescription theory has been extensively researched worldwide, particularly in developed countries. Initially applied primarily to coronary heart disease rehabilitation and physical activity guidance, exercise prescription has expanded its disease spectrum through ongoing research. Numerous studies have demonstrated benefits of scientific exercise for various chronic diseases [7]. With the advent of precision medicine, precision exercise prescription has emerged as a research focus, differing from personalized prescription by exploring exercise sensitivity at molecular and genetic levels across populations [8-9]. Additionally, big data-based exercise prescription research has advanced, from mHealth integration for primary care patient management to studies on ChatGPT applications in exercise prescription [10-11]. Although China's ex-

ercise prescription research started later, Chinese scholars have contributed to global development by incorporating traditional exercises like Baduanjin into therapeutic regimens [12]. With increasing national attention on “exercise for health promotion,” China launched the National Exercise Prescription Library Project [13], with experts progressively developing a prescription library tailored to Chinese citizens’ physical characteristics [14], laying a solid foundation for future implementation and promotion.

2.2 Progress in Professional Talent Cultivation for Exercise Prescription

Domestic and international cultivation of exercise prescription professionals involves both sports and medical sectors. However, foreign training systems are more mature, with physical therapists and clinical exercise physiologists recognized as professions that can independently diagnose and prescribe exercise in countries like the U.S. and Australia [15]. China’s equivalent to clinical exercise physiologists is the exercise rehabilitation curriculum launched in 2004 [16], offered primarily in sports and medical colleges. However, sports college graduates with exercise rehabilitation degrees face barriers entering hospitals in some regions and encounter difficulties obtaining professional certification [17]. In China, physical therapists are categorized under rehabilitation therapists, with only a few medical colleges offering specialized programs [18]. Moreover, the *Occupational Classification Dictionary of the People’s Republic of China* classifies rehabilitation therapists as technical personnel without authority to prescribe medical exercise. China’s 2016 Exercise Prescription Library Project established two certification tracks: the E-series for sports professionals and M-series for medical backgrounds [13], administered by the Chinese Sports Science Society. Medical professionals such as GPs and specialists undergo online and offline theoretical and practical training to obtain exercise prescription specialist certification upon passing examinations. In 2020, the “Chinese Exercise Rehabilitation Medicine Education Academy” continuing education program launched [19], promoting the concept of “standardizing exercise prescription and prescribing exercise rehabilitation.” Another certification system involves the Chinese Sports Science Society’s Exercise Medicine Branch and professional organizations introducing American College of Sports Medicine-certified clinical exercise physiologists, exercise instructors, and personal trainers through a Sino-foreign joint certification mechanism [20].

2.3 Application of Exercise Prescription in Primary Healthcare and Related Models

Changing disease patterns have increased focus on chronic diseases, highlighting the importance of scientific exercise in prevention and treatment. Both domestic and international initiatives advocate for chronic disease patients’ first contact with community care, where GPs serve as the primary source of consultation and advice. Foreign countries have explored models for GP-provided

exercise prescription services. The UK' s 1990 Exercise Referral Scheme has been adapted internationally with variations (Table 1), primarily concerning whether exercise prescriptions are issued by primary care physicians or by exercise specialists after referral. New Zealand' s Ministry of Health-supported Green Prescription program authorizes GPs in primary care to prescribe written exercise prescriptions (Green Prescriptions) [21], with exercise specialists providing telephone guidance, contrasting with Germany' s model where exercise specialists prescribe. China' s community exercise prescription application models have evolved from preliminary regional sports-medicine integration explorations before 2014 to explicit post-2016 community implementation. Scholars have summarized several models including community sports club, community physical fitness monitoring center, public-private partnership, and four-party cooperation models [22], all requiring coordination between sports and health departments. However, China' s current community exercise prescription development lacks clear leadership, particularly regarding who should prescribe and how departments should coordinate. This study argues that GPs, as community health gatekeepers, should play a leading role in chronic disease exercise prescription.

3.1 Necessity of GPs Prescribing Medical Exercise Prescriptions

Exercise prescription is an interdisciplinary concept requiring both medical knowledge and sports science expertise. In China, while physicians have prescribing authority, most lack formal education in exercise prescription development. Conversely, sports health professionals possess exercise prescription training but lack systematic medical knowledge, resulting in unrecognized prescribing authority within the healthcare system and low clinical utilization [15]. Due to absent industry standards, some hospitals even allow unqualified personnel to guide chronic disease rehabilitation [28]. With exercise prescription entering communities under Healthy China and national fitness initiatives, multiple randomized controlled trials have demonstrated positive effects of medically supervised exercise prescription for chronic disease patients in community settings (Table 2). Therefore, this study contends that under sports-medicine integration, medical exercise prescriptions should be issued by community GPs, coordinated with rehabilitation teams, family doctor teams, and community sports professionals. Through literature review, field visits to community health centers, and expert consultation combined with international referral models, this study proposes a community medical exercise prescription application model for China (Figure 1 [Figure 1: see original paper]): GPs become qualified prescribers through exercise prescription training. When residents visit GP clinics, GPs conduct physical activity measurement and assessment [29], then triage or develop prescriptions and provide health education based on activity levels and health status. Supported by national policies, pilot programs for smart community exercise health centers and chronic disease exercise intervention centers have been launched nationwide, facilitating development of a distinctive Chinese

exercise referral system.

3.2 Feasibility of GPs Prescribing Medical Exercise Prescriptions

The global burden of chronic disease continues escalating, with scientific exercise demonstrating preventive, therapeutic, and rehabilitative effects for conditions like coronary heart disease and hypertension. Since exercise prescription's inception, its effectiveness and cost-effectiveness have been consistently validated. Early 21st-century Chinese randomized controlled trials demonstrated that GP-supervised exercise management for hypertensive patients reduced medical costs [35]. Recent Dongfeng cohort studies showed that specific physical activity intensity reduced medical expenditures for hospitalized coronary heart disease patients, though sustained cost reduction requires continuous physical activity intervention [36]. With smart healthcare development, research on telemedicine-exercise prescription integration has shown significant medical cost reduction in primary care compared to usual care [37]. From a health economics perspective, GP prescription and supervision of medical exercise prescriptions can sustainably reduce chronic disease healthcare costs. The *14th Five-Year Plan for Health Talent Development* targets 3.93 GPs per 10,000 population by 2025; China had already reached 3.28 per 10,000 by 2022, ensuring at least one GP per primary care station and establishing GPs as the main force for community exercise prescription. GPs' scope of practice includes prescribing medical exercise and providing exercise guidance for patients, distinguishing them from rehabilitation therapists in community health centers. GPs provide continuous, comprehensive, health-oriented services conducive to guiding patients through periodic, staged, and sustained scientific exercise, enabling effectiveness evaluation and timely prescription adjustment. They also serve as health gatekeepers to promote exercise-for-health concepts and enhance residents' proactive health awareness.

3.3 Practical Challenges and Solutions for GP Exercise Prescription

While GP-prescribed medical exercise benefits community chronic disease management, numerous challenges persist. The primary issue is who will train GPs to become qualified medical exercise prescription specialists. International experience shows training exists from undergraduate through graduate levels, with continuing education certification well-established and nationally recognized. Chinese medical undergraduate programs only offer specialized exercise prescription courses in rehabilitation therapy majors. Continuing education certification is currently administered by the Chinese Sports Science Society, leaving its adequacy for medical exercise prescription needs unverified. In 2020, the Chinese Medical Association launched the "Chinese Exercise Rehabilitation Medicine Education Academy" continuing education program, establishing preliminary standards for exercise prescription development. Survey data shows most clinical undergraduates believe exercise prescription courses benefit career development and recommend them as electives [38]. Drawing from interna-

tional models like the UK' s Moving Healthcare Professionals Plan (MHPP) [39], this study recommends establishing continuous theoretical and practical elective courses in exercise prescription during medical undergraduate training, allowing qualified graduates to sit for exercise prescription specialist certification. During three-year standardized residency training, in-depth clinical exercise prescription practice and certification or recertification should be incorporated. The state should urgently establish unified certification standards for exercise prescription specialists, including qualifications for instructors and training institutions, while distinguishing between fitness and medical exercise prescription credentials to ensure legal validity and facilitate inter-sectoral collaboration.

From a health economics perspective, despite proven effectiveness across disease types and alignment with GP responsibilities, medical exercise prescription lacks national-level insurance coverage, though pilot programs exist in cities like Shanghai and Wuhan [40]. Research analyzing the national medical insurance database categorizes covered exercise prescription items into practice, examination, and assessment categories, with practice items most commonly reimbursed [41]. Based on community implementation status, this study proposes dividing insurance coverage into prescription assessment fees and treatment implementation costs. The former should follow exercise prescription guidelines for unified national insurance inclusion, while the latter should be determined provincially based on local referral network development and pilot experiences from Shanghai, Zhejiang, and Suzhou.

Furthermore, whether exercise prescription should be integrated into chronic disease management or prescribed independently like medication lacks standardized protocols [42]. Given GPs' already saturated workloads, surveys and interviews reveal most lack time to prescribe exercise [43], necessitating exploration of cost-effectiveness and incentive mechanisms. Since exercise prescription primarily targets chronic disease patients, this study recommends incorporating prescription and supervision into family doctor chronic disease management contract services, with prescription activities included in performance evaluations and professional title assessments to motivate community healthcare providers.

As China' s population ages and chronic disease prevalence rises, establishing exercise prescription within the integrated prevention-treatment-rehabilitation framework of primary healthcare holds significant practical meaning under national health and fitness strategies. GPs serve as critical coordinators for referrals and inter-sectoral collaboration. Support comes from established smart community exercise health centers and developing standards for chronic disease exercise intervention centers. With policy-driven growth in rehabilitation physicians and therapists soon joining primary care teams, medical exercise prescription in primary care can achieve endogenous and exogenous bidirectional management through medication and rehabilitation coordination, alleviating chronic disease burdens among older adults, improving healthy life expectancy, and ultimately achieving healthy aging and Healthy China goals.

Author Contributions: LI Chunlian conceived and designed the study, collected and organized research materials, and drafted the manuscript. ZHANG Ying, GUO Mingzhao, HE Meichen, and XU Lingling conducted literature review, collected and organized data, and prepared figures and tables. WANG Yongchen proposed the research topic and revised the manuscript.

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