Postprint: Construction and Practical Exploration of Grassroots Community Pharmacy Studios in Chongqing

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Abstract

Background Community pharmacy has demonstrated significant benefits through curbing drug abuse and chronic disease management; however, pharmacists face challenges including heavy workload, insufficient professional competence, and low public awareness. The Chinese government supports the innovation and expansion of pharmacists' roles, and the medical consortium model has emerged as an ideal solution for community pharmacy dilemmas. Objective This study aimed to establish a community pharmacy studio based on the medical consortium model to enhance community pharmacy service quality and chronic disease management outcomes. Methods From April 2023 to March 2024, our team conducted three randomized controlled trials across three communities within a medical consortium, with negative controls for all control groups. Trial 1: 254 medical professionals (physicians, pharmacists, and nurses) were randomly divided into two equal groups; the experimental group received pharmacy competency enhancement training, with training outcomes compared between groups. Trial 2: 540 community residents were randomly divided into two equal groups; the experimental group received community pharmacy studio services, with pharmacy competency, medication adherence, recognition of pharmacists, and service satisfaction compared between groups. Trial 3: 118 chronic disease patients were randomly divided into two equal groups; the experimental group received individualized medication guidance, with chronic disease indicator achievement rates compared between groups. Data were collected via questionnaires, interviews, and medical record reviews, and analyzed using SPSS 24.0 software. Results Survey results of pharmacy competency among medical professionals revealed that the proportion with high pharmacy competency in the experimental group (86.61%, 110/127) exceeded that of the control group (68.50%, 87/127) (2=11.966, P<0.01). Comprehensive assessment of community residents' pharmacy competency and

service satisfaction demonstrated that the proportion with higher pharmacy competency in the experimental group (76.30%) surpassed the control group (50.37%) (P<0.001). The proportion of community residents with high medication adherence in the experimental group (81.48%) exceeded the control group (68.52%) (P<0.01). Satisfaction with the pharmacy studio was reported by 96.67% of respondents in the experimental group, surpassing the control group (75.19%) (P<0.001). The proportion of experimental group residents who rated the pharmacist team' s professional knowledge favorably was 94.44%, higher than the control group (87.78%) (P<0.01). Conclusion The medical consortium-supported community pharmacy studio model effectively resolved bottlenecks in community pharmacy development, improved pharmacy service quality and patient disease management outcomes, and established a new standard for the future of community pharmacy. This model provides valuable experience for the development and innovation of community pharmacy services in China.

Full Text

Constructing and Exploring the Practice of Grassroots Community Pharmacy Studios in Chongqing

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Abstract

Background: Community pharmacy has demonstrated significant benefits in curbing medication misuse and managing chronic diseases. Nevertheless, pharmacists face challenges such as heavy workloads, inadequate professional competencies, and low public awareness. With government support for innovating and expanding pharmacists' roles, the healthcare alliance model has emerged as an ideal solution to address these community pharmacy dilemmas. **Objective:** This study aimed to establish a community pharmacy studio based

on the healthcare alliance model to enhance the quality of community pharmacy services and improve chronic disease management outcomes. **Methods:** From April 2023 to March 2024, our team conducted three randomized controlled trials across three communities within a healthcare alliance, with all control groups serving as negative controls. Trial 1: 254 healthcare professionals were randomly divided into two equal groups; the experimental group received pharmaceutical literacy training, and outcomes were compared between groups. Trial 2: 540 community residents were randomly divided into two equal groups; the experimental group received community pharmacy studio services, and pharmaceutical literacy, medication adherence, pharmacist recognition, and service satisfaction were compared. Trial 3: 118 chronic disease patients were randomly divided into two equal groups; the experimental group received individualized medication guidance, and chronic disease indicator control rates were compared. Data were collected through questionnaires, interviews, and medical record reviews, and analyzed using SPSS 24.0 software. **Results:** Survey results showed that the proportion of participants with high pharmaceutical literacy in the experimental group (86.61%, 110/127) was significantly higher than in the control group (68.50%, 87/127) (^{2}=11.966, P<0.01). Comprehensive assessment of community residents' pharmaceutical literacy and service satisfaction revealed that the experimental group had a higher proportion of residents with high pharmaceutical literacy (76.30%) compared to the control group (50.37%) (P<0.001). The proportion of community residents with high medication adherence was also higher in the experimental group (81.48%) than in the control group (68.52%) (P<0.01). Furthermore, 96.67% of respondents in the experimental group were satisfied with the pharmacy studio, significantly higher than the control group (75.19%) (P<0.001). The proportion of residents who recognized the professional expertise of the pharmacist team was 94.44% in the experimental group, higher than the control group (87.78%) (P<0.01). **Conclusion:** The community pharmacy studio model, supported by the healthcare alliance, effectively overcame bottlenecks in community pharmacy development, enhanced pharmacy service quality and patient disease management outcomes, and established new standards for the future of community pharmacy. This model provides valuable experience for the development and innovation of community pharmacy services in China.

Keywords: Pharmacy; Community pharmacy; Healthcare alliance; Optimization of service efficiency; Medication adherence; Management of chronic disease

Introduction

Globally, pharmacy service models are undergoing a transformation from drug supply-centered to patient-centered, comprehensive, and individualized pharmaceutical care [**?**]. The World Health Organization and other institutions advocate for pharmacists' role transformation throughout the entire disease prevention and control cycle, emphasizing their function as medication therapy experts

and health consultants [?]. Additionally, various countries have enacted laws and regulations—such as the U.S. Medicare Prescription Drug, Improvement, and Modernization Act of 2003 [?], medication therapy management regulations, and collaborative practice agreements [?]—and policy initiatives like the European pharmacist clinic system to empower pharmacists with greater professional responsibilities, effectively promoting the modernization of pharmacy services [?]. China' s pharmacy service model is also experiencing transformation, with policy directives emphasizing service quality improvement and the shift from drug supply to comprehensive personalized pharmaceutical care [?]. Both the "Healthy China 2030" initiative and medical and health system reforms explicitly require promoting pharmacists' transition from drug supply assurance to professional pharmacy service provision, participation in clinical decision-making, medication monitoring, and chronic disease management, achieving the shifting of medical resources to the grassroots level and optimized allocation [?]. The new version of the Drug Administration Law also strengthens pharmacists' legal responsibilities and status in rational drug use [?].

Against this backdrop of global pharmacy service model transformation, research on constructing and practicing community pharmacy studios based on healthcare alliances is crucial [?]. Community pharmacy has demonstrated remarkable achievements and cost-effectiveness in curbing drug abuse, improving patient medication adherence, and actively participating in chronic disease management [?]. However, deepening community pharmacy practice encounters multiple practical challenges: heavy daily workloads covering drug dispensing and prescription review; insufficient clinical knowledge reserves; limited public awareness and trust in pharmacists' professional roles; and the absence of performance incentive mechanisms. These factors collectively constitute bottlenecks restricting the vigorous development of community pharmacy. As a key component of the primary healthcare system, community pharmacy studios bridge resource allocation, integrate pharmacists' professional knowledge deeply into community services, optimize configuration, and enhance efficiency. Establishing community pharmacy studios can substantially improve primary pharmacy service quality, enabling pharmacists to play a professional guiding role in the entire chronic disease management process to improve efficacy, reduce adverse reactions, cultivate patients' self-medication abilities, and ensure medication safety [?]. Although developed countries have established comprehensive community pharmacy work systems and legislative support, enabling pharmacists to play key roles in chronic disease management and medication consultation, China' s community pharmacy studio construction remains in its infancy, facing challenges such as insufficient resource allocation, unclear pharmacist role positioning, non-unified service content and standards, low public awareness, and lagging regulations and policies [?]. According to preliminary investigations, pharmacy work in our hospital' s affiliated healthcare alliance primarily centers on drug supply assurance, with community pharmacists having insufficient understanding of pharmacy service transformation or facing difficulties in practice. According to the "Chongqing Opinions on Promoting the Con-

struction and Development of Healthcare Alliances," our hospital must conduct medication guidance training and support work for subordinate healthcare alliance units. Our hospital has a strong foundation in pharmaceutical technical guidance, with a team of 8 standardized-trained clinical pharmacists covering specialties in anti-infection, cardiovascular medicine, neurology, gastroenterology, critical care, and general practice, conducting pharmacy service clinics, pharmaceutical consultations, pharmacist residency, and scientific research and popularization to ensure rational drug use. Simultaneously, our hospital meets high standards in pharmacist staffing, drug supply, and equipment facilities, providing solid assurance for pharmacy services. Given this policy background and research context, this study aims to construct and practice a community pharmacy studio based on the healthcare alliance model to optimize resource allocation, enhance pharmacy service capacity, and improve chronic disease control rates. By providing popular science education to raise public awareness and utilization of community pharmacy studios and improve medication adherence, the study seeks to promote the formulation of relevant service policies, standardize service norms and evaluation systems, ultimately improve primary pharmacy service quality, help pharmacists play a professional guiding role in the entire chronic disease management process, ensure patient medication safety and efficacy, and enhance public health levels.

1.1 Construction Principles and Functional Positioning

The community pharmacy studio is jointly established by the pharmacy department of a secondary Grade A hospital and community health service centers, exploring a mechanism construction and quality system centered on our hospital' s clinical pharmacy department to actively promote the shifting of new pharmacy services to the grassroots level. The community pharmacy studio aims to rely on community health service resources, focus on residents' actual medication needs, and create a comprehensive platform integrating drug supply, pharmacy services, and health education. The construction strategy is shown in Figure 1 [Figure 1: see original paper]. First, through in-depth investigation of community medication status, the service positioning is clarified and service content is refined, including medication consultation, medication therapy management, chronic disease medication guidance, and adverse drug reaction monitoring. Second, pharmacy human resources and drug resource allocation are integrated and optimized, with high-standard construction and standardized work processes, using modern information technology to build an intelligent pharmacy information system. Simultaneously, an effective pharmacist training and incentive mechanism is established to enhance the professional quality and service efficiency of the pharmacist team. Furthermore, cross-departmental and cross-field cooperation and linkage are strengthened to build a good cooperative relationship network and jointly promote the popularization of rational drug use concepts. Finally, combined online and offline diversified publicity and promotion methods are used to improve community residents' awareness and satisfaction with pharmacy services, with regular service effectiveness evalua-

tions to continuously optimize and improve the functions and service models of the pharmacy studio, effectively enhancing service quality and residents' health levels.

1.2 Team Building and Personnel Training

The scale and professional composition of the pharmacist team constituting the community pharmacy studio are the foundation for providing quality services. Our team currently has 15 members, including: 7 full-time specialist clinical pharmacists covering cardiovascular medicine, neurology, gastroenterology, anti-infection, and ICU, all holding national or Chongqing clinical pharmacist certificates with bachelor' s degree or above in pharmacy. They are responsible for daily drug consultation, prescription review, medication reconciliation, and chronic disease patient medication guidance, focusing on medication therapy research and services for their respective specialty diseases to enhance the professional level of disease management. Two training and education specialists are responsible for organizing and implementing resident medication education activities to improve community residents' awareness and ability for rational drug use. Five assistant pharmacists and one intern assist in pharmacy service work while enhancing their own pharmacy service levels through practical learning. This pharmacist team composition can effectively meet the medication needs of different populations in the community and ensure the service quality and efficiency of the community pharmacy studio.

1.3 Workflow Design

The workflow design of the community pharmacy studio is crucial for service quality and efficiency. The specific process is shown in Figure 2 [Figure 2: see original paper]. Residents first make appointments via telephone, online platforms, or on-site visits. During consultation, pharmacists collect detailed patient information, medical history, and medication records to establish personal medication profiles, providing data support for personalized services. Pharmacists then conduct comprehensive medication assessments, including drug types, dosages, frequency, timing, and drug interactions, and provide medication consultation and treatment plan optimization, answering patient questions about drug use, adverse reactions, and drug substitutions. Pharmacists also conduct rational prescription review and medication reconciliation, eliminating ineffective drugs and adjusting unreasonable regimens, and formulate long-term management plans for chronic disease patients with regular follow-up and medication adjustments based on disease progression. Through special lectures, individual explanations, or promotional materials, pharmacists popularize medication knowledge and skills, such as proper administration, storage, and disposal of expired drugs, providing targeted guidance for special populations (elderly, children, pregnant women, etc.). The studio has established an adverse drug reaction monitoring and reporting mechanism to timely record and assess residents' medication discomfort, provide emergency treatment recommendations,

and adjust regimens when necessary to prevent similar incidents. Additionally, the studio implements a service quality monitoring system, regularly collecting resident feedback and analyzing work data for continuous service optimization, while urging the pharmacist team to continuously update professional knowledge through ongoing learning to ensure pharmacy service quality. The entire workflow design aims to achieve seamless connection and closed-loop management of pharmacy services, refining service links, strengthening pharmacist roles, improving service quality and efficiency, meeting community residents' medication needs, and contributing to building a healthy community.

2.1 Experimental Protocol Design

From April 2023 to March 2024, our team conducted three randomized controlled trials in three communities within a healthcare alliance, targeting healthcare professionals, community residents, and chronic disease patients. Inclusion criteria: aged 18 years or older, voluntary participation, and signed informed consent. Exclusion criteria: severe cognitive impairment preventing understanding of research content or questionnaire completion. All trials used simple randomization at a 1:1 ratio to assign eligible subjects to experimental and control groups, ensuring balanced comparability. Trial 1: 254 healthcare professionals (evenly divided between experimental and control groups) participated; the experimental group received a one-month pharmaceutical literacy training covering drug knowledge, doctor-patient communication, and medication therapy management, while the control group received no additional training. Pharmaceutical literacy questionnaires were administered one month later (>40 points considered high literacy, full score 50). Trial 2: With 540 community residents as subjects, the experimental group enjoyed one year of community pharmacy studio services including consultation and medication education, while the control group did not. After one year, residents' pharmaceutical literacy questionnaires were administered (>40 points considered high literacy), along with satisfaction, medication adherence, and pharmacist recognition surveys to compare satisfaction rates, adherence rates, and pharmacist recognition rates between groups. Trial 3: 118 chronic disease patients with hypertension, diabetes, or hyperlipidemia participated; the experimental group received one year of individualized medication guidance to optimize treatment regimens, while the control group received no additional guidance. After one year, chronic disease indicator questionnaires were administered to compare control rates. All three studies' data were processed using SPSS 24.0 software to assess between-group differences.

2.2 Enhancement of Healthcare Professionals' Pharmacy Service Effectiveness

The experimental group' s community healthcare professionals not only received a one-month customized pharmacy training program from the pharmacy studio but also participated in industry academic conferences, completing a total of 240 hours of professional training that enhanced their understanding and appli-

cation of new drug knowledge, disease management concepts, and cutting-edge pharmacy technologies. The average time for community pharmacists to handle the same complex drug consultation decreased from the initial 60 minutes to approximately 30 minutes. Survey results of healthcare professionals' pharmaceutical literacy showed that the proportion with high pharmaceutical literacy in the experimental group (86.61%, 110/127) was higher than in the control group (68.50%, 87/127), with a statistically significant difference (^{2}=11.966, P<0.01). These results indicate that the community pharmacy studio intervention significantly improved healthcare professionals' pharmaceutical literacy levels.

2.3 Comprehensive Assessment of Community Residents' Pharmaceutical Literacy and Service Satisfaction

The proportion of residents with high pharmaceutical literacy in the experimental group (76.30%) was higher than in the control group (50.37%), with a statistically significant difference (P<0.001). Specific improvements were observed in drug knowledge mastery, rational drug use awareness, and self-management capabilities. The proportion of community residents with high medication adherence in the experimental group (81.48%) was higher than in the control group (68.52%), with a statistically significant difference (P<0.01). Specific improvements were observed in taking medication on time, proper drug use, and following medical advice. This demonstrates that pharmacy popularization and medication education have positive effects on improving community residents' pharmaceutical literacy and adherence. Analysis of residents' satisfaction with the pharmacy studio showed that 96.67% of respondents in the experimental group were satisfied, significantly higher than the control group (75.19%), with a statistically significant difference (P<0.001). The proportion of experimental group residents who recognized the professional knowledge of the pharmacist team was 94.44%, higher than the control group (87.78%), with a statistically significant difference (P<0.01). See Table 1 .

2.4 Evaluation of Community Pharmacy Studio Service Quality

The community pharmacy studio also achieved positive progress in patient disease control. Through implementation of precise medication therapy management and continuous medication guidance, the experimental group achieved an 86.21% control rate for chronic diseases (hypertension, diabetes, hyperlipidemia), higher than the control group (71.19%), with a statistically significant difference (P<0.05). These data changes demonstrate the studio' s effectiveness in optimizing chronic disease management strategies, improving patients' quality of life, and reducing complication risks. Due to limited pharmacist manpower, one-on-one consultation services were restricted, and community pharmacy work was primarily implemented through popular science activities, patient education, and survey questionnaires; therefore, disease control rates did not increase substantially. Pharmacist effectiveness evaluation results showed

that 91.38% of experimental group residents reported that pharmacists played a positive role in disease control and quality of life improvement, higher than the control group (77.97%), with a statistically significant difference ($P<0.05$). See Table 2 . The community pharmacy studio conducted medication reconciliation for 58 patients in the experimental group, with 82.75% having their unreasonable medication problems effectively corrected after reconciliation, including avoiding unnecessary duplicate medications, reducing drug interaction risks, and improving medication therapy precision. After professional intervention and educational guidance by the pharmacist team, unreasonable medication phenomena in the experimental group were significantly curbed. For example, in hypertension and diabetes patients, non-standard medication behaviors decreased by 46 instances after following pharmacists' advice to adjust medication regimens. For elderly patients at high risk of drug interactions, one potential serious adverse event was avoided through pharmacists' professional guidance, fully demonstrating the studio' s positive role in enhancing residents' rational drug use awareness and behavior transformation.

2.5 Resource Utilization and Cost-Benefit Analysis

The establishment of community pharmacy studios improved alignment of medication use between higher and lower-level institutions. Community Health Service Center A was equipped with 75 varieties from the healthcare alliance drug catalog, with a 72.81% equipment rate and 70.87% consistency rate with our hospital. Community Health Service Center B was equipped with 77 varieties, with a 74.75% equipment rate and 70.87% consistency rate with our hospital. Community Health Service Center C was equipped with 80 varieties, with a 77.67% equipment rate and 75.73% consistency rate with our hospital.

During operation, the community pharmacy studio effectively implemented tasks assigned by the Health Commission through close collaboration with the healthcare alliance and successfully controlled operating costs under this model. Leveraging the healthcare alliance' s resource planning and sharing advantages, the studio significantly reduced expenses in manpower, material procurement, and equipment use by eliminating redundant investments, optimizing pharmacist allocation, and jointly conducting training activities, thereby greatly improving work efficiency and reducing daily operating costs.

Quality pharmacy services enhanced the brand influence of medical institutions, attracting more potential patients and creating positive social benefits and long-term economic value, such as potential drug sales profits and pharmacy service charges (e.g., drug consultation, medication guidance, medication reconciliation). By providing scientifically sound medication guidance, personalized medication therapy management, and comprehensive health education to residents, the studio significantly reduced medical resource waste and complications caused by irrational drug use, thereby indirectly saving overall medical expenditures. This service model, which penetrates grassroots levels and meets people' s needs, not only improves medical service quality and efficiency but also enhances the

public' s awareness of rational drug use and health management levels, giving them a genuine sense of health attainment.

3 Summary and Discussion

The community pharmacy studio project has been successfully expanded to three community hospitals. By enhancing pharmacy service effectiveness, improving residents' pharmaceutical literacy and medication adherence, and optimizing chronic disease management strategies, the project has significantly improved chronic disease service levels. Specific manifestations include: pharmacist time for handling complex drug consultations decreased from 60 minutes to approximately 30 minutes; healthcare professionals' pharmaceutical literacy improved by 18.11% ($P<0.01$); residents'pharmaceutical literacy improved by 25.93% ($P<0.001$); residents' medication adherence improved by 12.96% ($P<0.01$); pharmacist recognition increased by 6.66% ($P<0.01$); satisfaction with the pharmacy studio increased by 21.48% ($P<0.001$). Additionally, chronic disease control rates improved by 15.02% ($P<0.05$), and unreasonable medication problems were effectively corrected after medication reconciliation. Practice has proven that community pharmacy studios have achieved remarkable results in deepening pharmacist role transformation, improving residents' medication safety and rational drug use levels, and reducing complications, with increased resident recognition and widespread praise for public health education activities, accumulating valuable experience and demonstration effects for future nationwide promotion and optimization of community pharmacy services.

To promote the sustainable development of community pharmacy studios and fully leverage their role in primary healthcare services, multi-faceted support and encouragement are needed. First, policy support and funding investment should be sought, with clear community pharmacy service development plans formulated and community pharmacy studio construction included in government health budgets with special funding support. Project subsidies or reward mechanisms should be implemented for eligible studios to encourage purchase of advanced equipment, pharmacist team training, and development of characteristic pharmacy service projects. Second, community pharmacy talent introduction and training should be strengthened, with pharmacy continuing education funds established to support pharmacists' participation in professional training and improve service levels. Promotion channels for pharmacist positions should be established, with priority consideration for professional title promotion and technical position appointment for pharmacists making outstanding contributions in community pharmacy studios. Additionally, primary or secondary hospital pharmacy service items should be actively explored for inclusion in medical insurance reimbursement, such as medication education, medication reconciliation, and individualized medication regimen design, to reduce patient economic burden while increasing studio income sources. Collaboration with higher-level medical institutions, universities, and research institutions should be encouraged to share pharmacy resources and technical support. Regional col-

laborative networks among community pharmacy studios should be promoted to achieve complementary advantages and experience exchange. Series of promotional activities should be organized to enhance residents' awareness of the importance of community pharmacy services and guide them to actively seek pharmacists' professional guidance. Through these measures, community pharmacy studios can be further revitalized, promoting the shifting of pharmacy services to grassroots levels and better meeting community residents' growing needs for medication safety and rational drug use.

In the future, the new service model of community pharmacy studios will be closely integrated with emerging scientific and technological developments. For example, precision medication guidance based on big data and artificial intelligence will become the norm, enabling pharmacists to provide customized recommendations based on patients' genetics, lifestyle, and disease status [**?**]. Online-offline integrated services will gradually permeate (such as online appointment, remote consultation, drug delivery, smart pill boxes, health monitoring devices), enhancing pharmacy service convenience and achieving comprehensive, dynamic pharmacy monitoring [**?**]. The new service model is expected to generate significant social and economic benefits by reducing adverse reactions, lowering costs, and improving efficiency through precision medication and effective guidance, assisting in early chronic disease intervention and medication adherence improvement, reducing pressure on the healthcare system, and saving resources. Simultaneously, improving pharmacy operational efficiency, reducing costs, and creating commercial value. Facing the future, pharmacists' roles will transform from drug suppliers to comprehensive pharmacy service providers and health advisors, requiring mastery of not only pharmacy, medicine, and nutrition knowledge but also advanced knowledge and skills in pharmacogenomics and data analysis, with interdisciplinary collaboration and new technology application capabilities, strengthened communication and patient education, becoming trustworthy health partners. Despite challenges such as limited human resources, low resident acceptance of new knowledge, data security and privacy protection, and lagging laws and regulations [**?**], through scientific management, technology application, and policy support, community pharmacy studios will continue to deepen service content, expand service fields, and better meet community residents' medication safety and rational drug use needs.

Author Contributions: ZHAO Caiping was responsible for overall research design, project coordination, and final manuscript review; CHEN Min conducted experimental design, data collection design, and article writing; PENG Xiangting was responsible for specific operation of the community pharmacy studio and pharmacist team management; LI Xiaomei and GUAN Wenli were responsible for community healthcare professional training and popular science content design; GUO Fuli, LI Qin, and YE Rong were responsible for medication reconciliation, individualized medication guidance, conducting popular science activities, and data collection.

Conflicts of Interest: None declared.

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