Postprint of a Study on the Current Status of Community Pharmacy Services in Shanghai and Pharmacist Integration into Family Doctor Teams

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Abstract

Background Currently, the phenomenon of polypharmacy among residents is widespread, and due to the lack of medication reconciliation and comprehensive medication management, the risk of unsafe medication use is substantial. Providing community pharmacy services through community health service centers with regional advantages aligns with their functional positioning; however, a significant gap remains between the supply of pharmacy services at community health service centers and public demand. Objective To understand the current status of community pharmacy services in Shanghai, the integration of pharmacists into family doctor teams, and the challenges faced by community pharmacy services, with the aim of providing recommendations to promote the development of community pharmacy services. Methods A mixed-methods approach combining qualitative and quantitative research was employed. In December 2020, stratified sampling was used to conduct a questionnaire survey among 307 practicing pharmacists currently working at 29 community health service centers (6 in central urban districts, 8 in near-urban districts, and 15 in outer-urban districts). The survey content included basic information about pharmacy personnel, the implementation of community pharmacy services, and the participation of community pharmacists in family doctor teams. During the same period, convenience sampling was used to invite 29 key informants, including 11 pharmacy department heads, 6 family doctor representatives, and 12 community health center directors and health commission administrators from central, near-urban, and outer-urban districts, to participate in semi-structured focus group interviews addressing three aspects: pharmacy service demand, pharmacy resource allocation, and pharmacy service processes. Results Quantitative research findings indicated that participation in 1–2 training sessions was most common among community pharmacists [139 (45.3%)], with contin-

uing education being the primary training format [252 (82.1%)]. The three most frequently provided pharmacy service items by community pharmacists were prescription dispensing [284 (92.5%)], prescription review [253 (82.4%)], and pharmacy window or outpatient consultation and guidance [196 (63.8%)]. The three items occupying the longest service duration for pharmacists were prescription dispensing [280 (91.2%)], prescription review [244 (79.5%)], and prescription evaluation [145 (47.2%)]. A total of 78 (25.4%) pharmacists had joined family doctor teams. Qualitative research findings revealed: regarding community residents' pharmacy service demand, elderly community residents had substantial pharmacy service needs but possessed weak awareness of rational medication use; regarding community pharmacy resource allocation, there was a shortage of pharmacists, professional competence needed improvement, the community pharmacy drug formulary was incomplete, and the role of information technology required strengthening; regarding community pharmacy service processes, community pharmacists had low recognition, service content was monotonous, targeted rational medication use training was relatively limited, and pharmacists failed to play an effective role within family doctor teams. Conclusion Currently, community pharmacy service resource allocation and supply capacity cannot meet residents' demands, and pharmacy service processes require further improvement and optimization. Only a portion of pharmacists have joined family doctor teams, with limited effectiveness in these teams; thus, enhanced incentive mechanisms, clearly defined service content, and improved service models are needed.

Full Text

Current Situation of Community Pharmacy Services and the Integration of Pharmacists into Family Doctor Teams in Shanghai

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Abstract

Background: Polypharmacy is common among residents, posing high risks of unsafe medication use due to the lack of medication reconciliation and comprehensive medication management. Community pharmacy services provided by community health service centers (CHSCs) align with their functional posi-

tioning and regional advantages, yet a substantial gap remains between service supply and public demand.

Objective: To investigate the current status of community pharmacy services and pharmacist integration into family doctor teams in Shanghai, identify challenges facing community pharmacy services, and provide recommendations for advancing their development.

Methods: A mixed-methods approach combining qualitative and quantitative research was employed. In December 2020, a stratified sampling method was used to survey 307 licensed pharmacists working in 29 CHSCs (6 in central urban areas, 8 in inner suburban areas, and 15 in outer suburban areas). The questionnaire covered basic demographics, training, pharmacy service implementation, and participation in family doctor teams. Concurrently, 29 key informants were recruited through convenience sampling for semi-structured focus group interviews, including 11 pharmacy department heads, 6 family doctor representatives, and 12 community center directors and health commission managers from all three area types. Interviews focused on pharmacy service needs, resource allocation, and service processes.

Results: Quantitative findings revealed that 45.3% of community pharmacists attended training 1–2 times annually, primarily through continuing education (82.1%). The three most commonly provided pharmacy services were prescription dispensing (92.5%), prescription review (82.4%), and pharmacy window/outpatient consultation (63.8%). These same activities—prescription dispensing (91.2%), prescription review (79.5%), and prescription evaluation (47.2%)—consumed the most service time. Only 25.4% of pharmacists had joined family doctor teams. Qualitative findings indicated that while elderly residents had substantial pharmacy service needs, their awareness of rational medication use was low. Resource allocation challenges included pharmacist shortages, inadequate professional competence, incomplete community drug formularies, and underutilized information systems. The service process suffered from low pharmacist recognition, limited service scope, insufficient targeted training on rational drug use, and minimal pharmacist contribution within family doctor teams.

Conclusion: Current resource allocation and service capacity cannot meet residents' needs, and pharmacy service processes require improvement and optimization. With only a minority of pharmacists integrated into family doctor teams and limited roles played, enhanced incentive mechanisms, clearly defined service content, and improved service models are urgently needed.

Keywords: Pharmaceutical Services; Community Health Service Center; Family Doctor Team; Quantitative Research; Qualitative Research

Introduction

Primary healthcare services constitute the foundation of China's three-tier medical service system and public health network, serving as the starting point for tiered diagnosis and treatment and the core of primary healthcare delivery. The "Healthy China 2030" Blueprint emphasizes "prioritizing primary-level care and promoting reform and innovation" to ensure that "primary-level institutions can generally serve as gatekeepers for residents' health" [1]. Medications remain the primary approach for disease prevention and treatment. With changing disease patterns and population aging, multimorbidity has become common, increasing both medication needs and risks [2]. The lack of professional medication reconciliation and comprehensive medication management has led to widespread unsafe medication practices. Given their functional positioning and regional advantages, CHSCs are well-suited to provide medication reconciliation and continuous medication management. However, community pharmacy service models in China remain exploratory, with a significant gap between service supply and public demand. Shanghai's family doctor system has achieved initial success, with high acceptance of contracted services and integration of pharmacy services into family doctor contracts, enabling precise targeting of needs and efficient service delivery to all contracted individuals. This study investigates the current status of pharmacy services in Shanghai's CHSCs and pharmacists' integration into family doctor teams to understand service supply and explore how combining pharmacy services with the maturing family doctor system can promote community pharmacy development.

Methods

Study Design and Participants

Shanghai's 16 districts were stratified into three layers based on economic level and distance from the city center: central urban, inner suburban, and outer suburban areas [3]. In December 2020, a stratified sampling method selected 6 CHSCs in central urban districts (Xuhui, Jing'an, Yangpu), 8 in inner suburban districts (Minhang, Baoshan, Jiading, Pudong), and 15 in outer suburban districts (Jinshan, Songjiang, Qingpu). All licensed pharmacists on duty at these 29 CHSCs were surveyed (n=307). Concurrently, convenience sampling recruited 29 key informants for focus group interviews: 11 pharmacy department heads, 6 family doctor representatives, and 12 community center directors and health commission managers from all three area types. All participants provided informed consent. The study was approved by the Ethics Committee of Jinshan Tinglin Hospital (Approval No. 202011-01) and followed the ethical principles of the Declaration of Helsinki.

Data Collection

This study employed a mixed-methods design. Quantitative research collected data on pharmacist demographics, pharmacy service implementation, and par-

ticipation in family doctor teams to comprehensively understand current service status. Qualitative research focused on challenges in pharmacy service needs, resource allocation, and service processes.

Quantitative Study The research team developed a "Community Pharmacy Staff Questionnaire" based on literature review and site visits. Content included demographic and socioeconomic characteristics, training, service implementation, and family doctor team participation. The questionnaire was validated by graduate supervisors and experts, with a pilot survey showing a Cronbach's α coefficient of 0.850 for 10 items, indicating good reliability. With assistance from district health commissions and quality control by graduate students, the questionnaire was distributed via Wenjuanxing, yielding 64 responses from central urban, 108 from inner suburban, and 135 from outer suburban areas.

Qualitative Study Interview guides were developed based on literature review, expert consultation, and questionnaire findings, covering: (1) current status of rational drug use among community residents; (2) existing pharmacy services and whether they meet residents' needs; (3) institutional norms, standards, workflows, and incentive mechanisms for pharmacy services; (4) pharmacist integration into family doctor teams, including pathways and responsibilities; (5) challenges in pharmacy workforce, information systems, service processes, and institutional development; and (6) recommendations for enhancing community pharmacy service capacity. Semi-structured focus group interviews were conducted by graduate students, with flexible adjustment of question order and follow-up on valuable topics [4]. With participants' consent, interviews were recorded and anonymized (Y1–Y11 for pharmacy heads, J1–J6 for family doctors, G1–G12 for administrators).

Statistical Analysis

Quantitative data were cleaned and organized using Excel 2016 and analyzed with SPSS 22.0. Categorical data were presented as frequencies and percentages, with group comparisons using ^{2} tests or Fisher's exact test. Statistical significance was set at $P<0.05$.

For qualitative data, recordings were transcribed and independently coded by two researchers. Coding results were compared and discrepancies discussed to reach consensus. NVivo 12 software was used for coding analysis, with thematic framework analysis applied to identify meaningful concepts and establish themes and subthemes [5-6]. The Macro Model of Health System [7] informed part of the analytical framework.

Results

Basic Characteristics of Community Pharmacists

Among the 307 community pharmacists, 238 (77.5%) were female, 156 (50.8%) were aged 30–39 years, 230 (74.9%) held bachelor's degrees, 253 (82.4%) majored in pharmacy, 139 (45.3%) had junior pharmacist titles, and 121 (39.4%) had 11–19 years of pharmacy experience. Regarding training, 139 (45.3%) attended training 1–2 times annually, primarily through continuing education courses (252, 82.1%), hospital pairing assistance (160, 52.1%), self-organized training (120, 39.1%), or advanced studies (107, 34.9%). Only 86 (28.0%) held Shanghai Community Clinical Pharmacist qualifications. Statistically significant differences across area types were found in age, years of pharmacy experience, and participation in hospital pairing assistance ($P<0.05$) .

Community Pharmacy Service Implementation

The three most frequently provided services were prescription dispensing (284, 92.5%), prescription review (253, 82.4%), and pharmacy window/outpatient consultation (196, 63.8%). The three most time-consuming activities were prescription dispensing (280, 91.2%), prescription review (244, 79.5%), and prescription evaluation (145, 47.2%). All other services accounted for less than 25.0% of activities. Service delivery primarily occurred through consultation windows (296, 96.4%), followed by pharmacy clinics (155, 50.5%). Statistically significant area differences were observed in "medication knowledge consultation or training for medical staff" and "discharge medication guidance" among the top three time-consuming activities ($P<0.05$) .

Pharmacist Participation in Family Doctor Teams

Only 78 pharmacists (25.4%) had joined family doctor teams. Among these, the top three activities were rational medication education (69, 88.5%), patient medication guidance and consultation (68, 87.2%), and medication follow-up (36, 46.2%) .

Qualitative Interview Findings

Three major themes with eleven sub-themes emerged, summarizing challenges in community pharmacy service demand, resource allocation, and service processes.

Theme 1: Community Residents' Pharmacy Service Needs High prevalence of multimorbidity and polypharmacy among elderly residents. Interviewees noted that elderly residents frequently had multiple chronic conditions and used numerous medications simultaneously. Y4 explained: "Our community hospital limits each prescription to five medications, but elderly patients with multiple chronic diseases often visit for three consecutive days, get-

ting five medications each day, leading to accumulation." Some elderly patients concurrently used over ten medications. J1 highlighted overuse of auxiliary medications: "Many elderly patients believe in traditional Chinese medicine, with excessive use of auxiliary drugs—one of my previous patients took five to six Chinese patent medicines." G4 described redundant prescribing: "A patient might receive a blood-activating drug from cardiology for heart disease, another from neurology for stroke, and another from orthopedics for bone pain, resulting in multiple drugs with similar effects or even identical ingredients." G7 noted misconceptions about health supplements: "Many elderly take numerous supplements, some containing medicinal ingredients. For example, supplements marketed for diabetes may contain hypoglycemic components that complicate blood sugar control."

Low awareness of rational medication use and poor adherence. Patients lacked initiative in seeking pharmacy services. G4 stated: "Public awareness of pharmacy service needs is inadequate. Patients don't actively demand services, often obtaining medication information from hearsay and requesting specific drugs against medical advice." G5 added: "Many general outpatient patients arrive demanding specific medications, saying 'I've seen experts at large hospitals who prescribed this,' leaving us unable to counter." J2 noted adherence issues: "While some of my contracted patients take medications as directed, self-discontinuation and dose adjustment are common among the elderly." G7 also observed poor medication storage practices: "Elderly patients don't pay much attention to proper storage and expiration dates, taking expired or degraded medications, creating safety hazards."

Theme 2: Community Pharmacy Resource Allocation Unreasonable staffing and pharmacist shortages. Multiple administrators reported insufficient establishment quotas and staffing shortages. G7 explained: "Community recruitment is based on family doctor team size, with auxiliary staff limited to 30% of the team, restricting pharmacist recruitment." G2 noted: "With insufficient establishment quotas, we have to hire non-established pharmacists." Y1 stated: "With only three or four pharmacists, joining family doctor teams is impossible—we need at least ten." Y2 described workload constraints: "We have ten pharmacists, which is relatively many, but they're just enough for outpatient dispensing with no dedicated staff for clinical pharmacy work." G3 highlighted rural shortages: "The lack of pharmacy professionals is more severe in village clinics, where only rural doctors are available."

Inadequate service capacity and professional competence. Community pharmacy service capacity and quality were insufficient to meet demand. Y3 acknowledged: "Without systematic training, clinical pharmacists lack the ability to assess diagnostic accuracy or provide medication guidance." Y4 admitted: "While we document adverse drug reactions during ward rounds, we cannot provide other medication guidance, and even when we do, clinicians and patients may not accept it—we're merely auxiliary." Y7 attributed limitations

to experience: "Long-term primary-level work with limited drug and disease exposure results in insufficient experience compared to large hospitals." G8 concurred: "Our current pharmacy team's professional capacity is inadequate to meet residents' needs." G9 identified a mismatch: "The medication guidance pharmacists provide focuses on drug-specific suggestions rather than disease management strategies, failing to meet the needs of general practitioners who require holistic treatment plans."

Lack of incentive mechanisms and low status. Rational compensation mechanisms significantly impact staff motivation. Currently, pharmacy departments lack standardized workload metrics. Although each community has its own compensation system, it poorly reflects performance, failing to motivate staff. G12 explained: "Pharmacists have low status and compensation in CHSCs. Without standardized workload metrics, pharmacy work isn't included in performance-based pay. Previous compensation came from drug markups, but with zero markup policies, no pharmacy service fees have been established." Y9 added: "Communities allocate a portion of their total performance budget to pharmacists, but this isn't tied to workload—each community decides arbitrarily."

Incomplete drug formulary and supply disruptions. Community drug formularies are limited, primarily covering essential medications. G12 noted: "Due to policies like volume-based procurement, communities are restricted to procurement catalogs, sometimes leaving no suitable drugs available for certain diseases or rational treatment principles." G7 explained: "With basic drugs required to account for 90% of usage, non-essential drugs are limited. While CHSCs can supplement formularies and family doctors can issue extended prescriptions, residents' needs often remain unmet." G9 added: "Even after adding 120 extended drugs to our original 250, we still cannot satisfy demand. Market forces and insurance policies frequently cause drug shortages and stockouts." G11 concluded: "The current procurement system affects drug accessibility and choice—sometimes we have no options at all."

Improving but underutilized information systems. Pre-prescription review, prescription evaluation, and rational drug use monitoring systems are increasingly implemented but remain limited. G3 stated: "Our pre-prescription review system for Chinese and Western medicines helps identify unreasonable prescriptions and improves qualification rates. Monthly prescription evaluation through the platform enhances quality and informs clinical rational drug use. However, the lack of mandatory interception and low intelligence limits effectiveness." G10 agreed: "The pre-prescription review system exists but doesn't function effectively. It flags potential issues but only reminds doctors without mandatory intervention, allowing them to ignore warnings, making it somewhat useless."

Theme 3: Community Pharmacy Service Processes Physicians performing pharmacy duties and low pharmacist recognition. Due to resi-

dents' habits and pharmacists' role confusion, medication guidance is typically provided by physicians. Even for consultations, patients contact family doctors, marginalizing pharmacists. G6 explained: "Patients see pharmacists as mere dispensers, not expecting specialized medication reconciliation or guidance." Y11 added: "Patients ask about dosage and administration but not other issues." G4 noted: "Patients and doctors don't accept mandatory pharmacist review. When clinical pharmacists identify irrational prescribing, neither doctors nor patients listen—this is very common." G11 concluded: "Pharmacist reviews focus on prescription formatting rather than rational drug use, which they cannot strictly enforce."

Limited service scope and insufficient rational drug use involvement. Primary-level pharmacists primarily work in dispensing. Although they conduct some rational drug use education, ward rounds, and guidance, involvement remains inadequate. G7 described efforts: "We've promoted the concept of 'zero distance between pharmacists and patients' by having pharmacists leave their windows for community education and establishing pharmacy clinics next to family doctor offices." However, G5 admitted: "While we implement all required services like prescription evaluation and pharmacy clinics, the results are poor. Rational drug use work mainly addresses assessment requirements rather than actual needs." G9 explained: "Large hospital clinical pharmacists are dedicated, but community clinical pharmacists are part-time, juggling dispensing with assessment requirements for clinical services. We can only meet basic requirements, not achieve true service effectiveness. Our main work is dispensing and prescription evaluation."

Insufficient and non-targeted training. With expanding drug formularies and new drug introductions, community healthcare workers' limited education constrains their pharmaceutical knowledge, particularly clinical pharmacology. Y11 stated: "Insufficient knowledge keeps much work superficial. We hope for more professional guidance—our previous textbook knowledge is now outdated." Y10 added: "Targeted training for pharmacists is scarce. Many extended drugs for chronic diseases are unfamiliar, making guidance impossible." G12 described current training: "Pharmacy assistance within medical alliances involves secondary and tertiary hospital pharmacists regularly providing rational drug use training, prescription evaluation, and staff education."

Low integration into family doctor teams and limited role. Many CHSC pharmacists haven't joined family doctor teams, and those who have lack time for in-depth services due to staffing shortages. J1 expressed: "Family doctors want pharmacists on their teams. Pharmacists should provide medication guidance to us." J3 acknowledged constraints: "We hope for it, but with only three or four pharmacists for eight family doctor teams, the workload is impossible." G3 described their approach: "Each pharmacist participates in 2–3 family doctor teams among our 17 teams, serving as team members." G5 noted: "All our pharmacists have joined family doctor teams, but their actual effectiveness remains exploratory. Patients consult family doctors, not pharmacists, for med-

ication issues."

Discussion

Strengthening Pharmacist Workforce and Incentives

Qualitative findings reveal severe pharmacist shortages in Shanghai. Increasing establishment quotas would free pharmacists from dispensing to provide clinical services. Shanghai has yet to issue specific pharmacy service fee standards. Rational compensation mechanisms can significantly enhance motivation [10]. Drawing from international experiences in Europe, America, and Japan, authorities should develop fee standards based on clearly defined service content, linking performance-based pay to service volume, quality, and satisfaction to boost initiative [11-13].

Enhancing Continuing Education and Training

Survey results show 45.3% of pharmacists receive only 1–2 training sessions annually, while 24.4% receive none. Pharmacy directors report insufficient systematic training and limited competence. Training programs and frequency should increase with targeted content. To address the current ad hoc approach, clear plans should be developed with short-, medium-, and long-term phases specifying objectives, content, and direction [14]. Medical alliance platforms can facilitate pharmacy assistance through regional "pharmacy service alliances" and chief pharmacist systems for integrated pharmaceutical management [15-17].

Transforming Pharmacy Service Philosophy

Interviews show low self-recognition among community pharmacists, who passively provide services. In 2009, WHO and FIP declared that pharmacists should be health service providers, decision-makers, communicators, managers, lifelong learners, educators, leaders, and researchers [18-19]. Pharmacy services should shift to "patient-centered models emphasizing pharmaceutical expertise and clinical involvement," making pharmacists drug use experts rather than mere dispensers [20]. Pharmacists must transform their service philosophy, enhance capacity, and establish authority in medication use.

Standardizing Community Pharmacy Services

Current community pharmacy services are narrow, with dispensing dominating both scope and time. Interviewees confirmed that most pharmacists perform only dispensing and distribution [21]. Standardized pharmacy service management is common internationally; both the UK's universal health system and the US market-based system provide uniform, standardized services [22-23]. While experts have developed "Medical Institution Pharmacy Service Standards" [24] and "Family Pharmacist Service Standards and Pathways" [25], these lack specificity and enforceability for CHSCs. Administrative departments should develop

unified Shanghai-specific service items and content.

Leveraging Information Technology

Through pharmacy service alliances, regional pharmacy information platforms and medication record APPs should be established to provide remote consultation, online lectures, patient education, knowledge databases, electronic medication records for chronic diseases, and information sharing [26]. Smart pharmacies and dispensing machines can liberate pharmacists from mechanical tasks, enabling focus on patient guidance and reducing waiting times [27].

Integrating Pharmacists into Family Doctor Teams

Incorporating pharmacists into family doctor contracted service teams extends community pharmacy services to all contracted residents, providing direct, comprehensive, and specialized medication management that improves irrational drug use and supports family doctor system implementation. Currently, only 25.4% of pharmacists have joined teams with limited roles. Future exploration should focus on tiered and classified management models, categorizing residents into general, high-risk, and chronic disease populations for targeted services including medication management, monitoring, consultation, and education [13].

Limitations: This mixed-methods study is constrained by sample size and participant cognition, potentially limiting generalizability. The questionnaire's investigation of pharmacist integration into family doctor teams lacked depth, warranting future research on service models and pathways.

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