



The development of urban community health centres for strengthening primary care in China: a systematic literature review

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Abstract

Introduction: This review outlines the development of China's primary care system, with implications for improving equitable health care.

Sources of data: Government documents, official statistics, and recent literature identified through systematic searches performed on NCBI PubMed.

Areas of agreement: Community health centres (CHCs) are being developed as the major primary care provider in urban China, with laudable achievements. The road towards a strong primary care-led system is promising but challenging.

Areas of controversy: The effectiveness in improving equitable care through the expansion of primary care workforce and redesign of the social medical insurance system warrants further exploration.

Growing points: Healthcare disparities exist in the health system wherein universal health coverage and gatekeepers have not yet been established.

Areas timely for developing research: Future prospective studies should aim to provide solutions for strengthening the leading role of CHCs in providing equitable care in response to population ageing and multimorbidity challenges.

Key words: primary care, community health centres, service provision, patients' experiences, organizational models, multimorbidity, equitable care

Introduction

China, as the largest and most populous developing country in economic and demographic transition, has been shaping its primary care system during the past several decades.^{1,2} In the early 1950s right after Mao's Revolution, health stations with bare-foot doctors carried out population-based preventive health services and mass mobilization health campaigns. They acted as the initial point of contact in relation to the secondary care. The government owned most enterprises in urban areas, and employees and their families were provided with free access to basic medical care. Meanwhile, the cooperative medical scheme was operating in rural villages, covering over 90% of the population. The massive subsidy granted by the government ensured a nationwide healthcare coverage in both urban and rural areas during the planned economy period. Starting from the early 1980s, however, the healthcare system became market-oriented in tune with the radical economic reforms and urbanization. The government shrank its investment in primary care, and health care was seen as free-market consumption activities instead of public good.³ Under-trained doctors constituted the majority of general practitioners (GPs). The generalists were deemed less competent than specialists at secondary care, where high-cost, treatment-orientated care was dominant. Health care relied heavily on user fees and drug revenues to maximize revenue. This has led to an increasing proportion of individual out-of-pocket payments and inadequate healthcare coverage for almost 20 years.⁴

In view of the dilapidated primary care infrastructure and healthcare inequity, promoting community health service (CHS) has become a prioritized policy agenda, in line with the Chinese government's overall goal of re-strengthening primary care networks based on community health centres (CHCs) (Fig. 1). As part of the comprehensive healthcare reform embarked on in 2009, the social and medical insurance schemes have been improved, including

(i) basic medical insurance for urban employees (mandatory for employed individuals) and residents (voluntary at households, including children, students, elderly, disabled and other non-working urban residents); (ii) new rural cooperative medical scheme (NRCMS) for rural citizens (voluntary) and (iii) medicaid system for deprived populations.^{1,5} The 'Healthy China 2020 Plan' depicted an equitable healthcare system delivering safe, effective, convenient and affordable basic health care for all citizens by 2020.⁶

However, unlike primary care in the UK, primary care is currently still weak in China. Primary care providers do not have a gatekeeper function, and health care is not free at the point of access. Both GPs at CHCs (primary care) and specialists at hospitals (secondary care) can be directly accessed by walk-in patients. The social medical insurance, albeit being developed, offers limited benefits. Patients' private out-of-pocket payment contributed 42% of total health expenditure in 2008⁵ as most patients are currently served through a fee-for-service delivery system. However, China, like other developed countries, is also facing numerous challenges such as an ageing population and growing burden of chronic disease risk factors particularly in urban areas.⁷ In this review, we have sought to outline China's primary care in urban areas where CHCs serve as the major primary care provider. The review had a major focus on the development of CHCs under the national healthcare policies and also the impact of primary care reform on key issues including service provision, patients' experiences, service utilization, emerging primary care organizational models, disease management and improvement of maternal and childcare based on the most recent findings.

Search strategy

The search strategy was developed to identify literature on national policies on developing community health care, and empirical findings relating to service

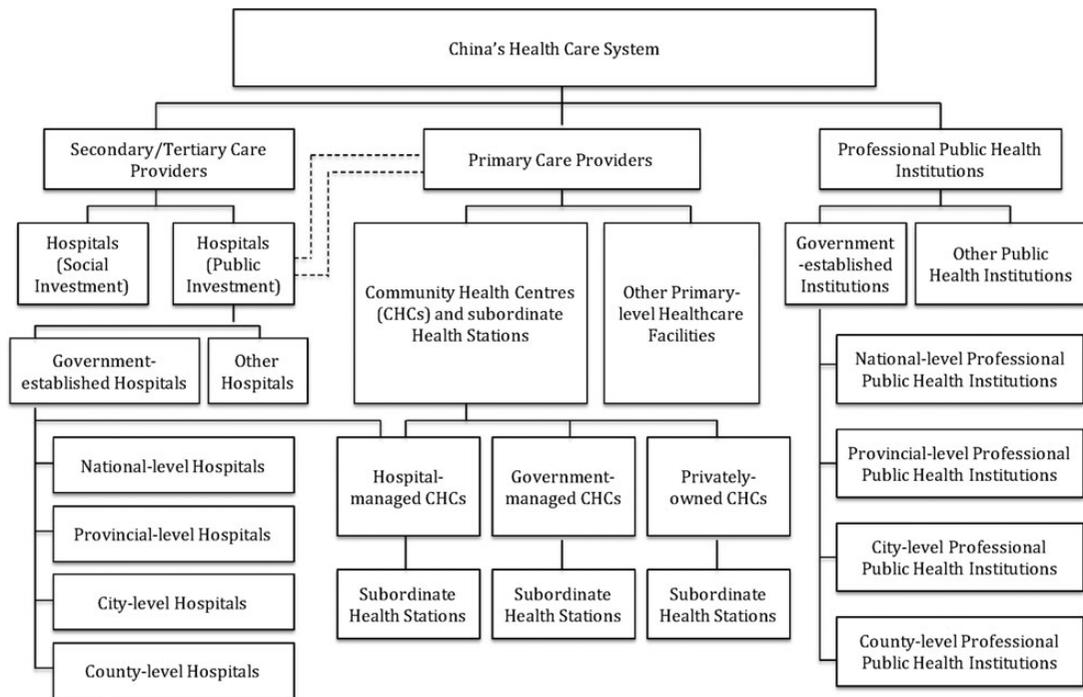


Fig. 1 Healthcare system and primary care providers in China. The healthcare structure is depicted according to the most recent National Healthcare Policy-announcement of strategic plan on National Health Care Service System (2015-20): State Council, P.R. China, 2015. The dashed lines denote dual referral channels between primary care and secondary (tertiary) care providers. Other hospitals refer to hospitals established by the military, state-owned or collectively owned enterprises. Other primary-level healthcare facilities include township health centres and stations, village clinics and countryside infirmaries. Professional public health institutions include centres for disease control and prevention, regulatory and supervisory bodies, maternal and child health centres, first aid centres and stations, as well as blood donor centres. Other public health institutions refer to institutions established by the state-owned or collectively owned enterprises.

provision, patients' experiences, service utilization, primary care organizational models and healthcare management. Given the nature of this review, we did not aim to perform a meta-analysis pooling results. A systematic search was performed in September 2015, by a review panel consisting of one public health professional (H.H.X.W.) and three primary care professionals (J.J.W., M.C.S.W. and S.Y.S.W.) to identify literature in both English and Chinese (Supplementary Fig. S1). In the first stage, a combination of terms and synonyms pertaining to primary care, family medicine, general practice and community health centres were developed as text words to search potentially relevant literature published in NCBI PubMed-indexed journals in the previous 36 months. In the second stage, full-text articles that covered policy development, CHC structures, service

utilization, organizational models, patients' experiences, disease management, as well as maternal and child care were included following the inclusion criteria set after a panel discussion. A total of 79 articles were identified according to the title and abstract by two investigators (H.H.X.W. and M.C.S.W.) independently. In the third stage, all panel members conducted a selective review based on the full text of publications retrieved in the previous stage. The exclusion criteria were articles that conveyed no empirical evidence or quantitative studies with small sample size (<800). If similar findings were presented from more than one publication, only the more recent and informative full-text article was included. Reference lists of selected articles were also examined. Given that a significant body of work regarding the progress of the primary care reform has taken the

form of official publications, the China Health Statistics Yearbook series (from 2002 to 2015) and government documents (from 1997 to 2015) were also reviewed by native Chinese speakers (H.H.X.W. and J.J.W.). Disagreements were resolved by consensus after discussion or, when necessary, by appeal to the senior investigators (S.W.M. and S.M.G.). A total of 38 publications including 20 government official publications and 18 articles from NCBI PubMed were reviewed. Five studies gathered data from nation-wide samples, while the other 13 studies were conducted regionally with widespread geographical distribution across China (Supplementary Table S1).

Policy development

Primary care in urban areas has been re-strengthened step wisely since early 1997 (Table 1),^{8–27} where the conception of CHS was firstly mentioned in the national policy.⁸ In the following years between 1998 and 2005, a series of policy documents and guidelines were issued to contextualize CHCs and its subordinate health stations for primary care delivery.^{9–13} The establishment of a functional and convenient CHS-based primary care system required the optimization of healthcare resource allocations. The Ministry of Health (MoH) also called for strategies to enrich front-line GPs through CHS in-service training.¹¹ The concept of CHS was officially defined as -

part of the urban community construction. It is delivered predominantly by GPs as the cadre, based at primary-level health care facilities, with an appropriate use of community resources and health care techniques. The services should be centred on person within the family context, focusing on the basic health care need of women, children, elderly, disabled and patients with chronic conditions. It should integrate prevention, treatment, protection, rehabilitation, education, and family planning, as a six-in-one care package, to maintain and improve population health. The CHS is fundamental to the ultimate goal of achieving primary care for all.¹⁰

Several policy regulations were further issued in 2006,^{14–19} covering the premises, registration, operation and pricing at the CHCs. Equity, efficiency

and accessibility were highlighted. These plans laid CHCs in place in every neighbourhood within a 15-min walking distance to ensure close-to-home primary care. The government sector with public investment were required to play a leading role in developing primary care, while investments from the social and private sector were also encouraged.¹⁴ The academic discipline of GP began to emerge in medical universities with the aim to build a cohesive undergraduate medical curriculum, a standardized post-graduate professional training, and continuing education for GPs. The GP training scheme was structured and included class-based learning, clinical rotation and community practice in primary care medicine.^{17,19}

A series of detailed action plans were subsequently announced between 2009 and 2011,^{20–24} including the effort for improving the provision of public health care through a nation-wide implementation of basic public health (BPH) service package.²³ The government subsidies on the BPH service package were determined by the number of people served by the CHCs, with the minimum amount increasing from ¥15 (£1.5) to ¥25 (£2.4) in 2011. The BPH services contained eleven programmes covering (i) establishment of health profiles and medical records; (ii) provision of health education; (iii) disease prevention and vaccination; (iv) health management for the elderly (aged 65 years and above), pregnant women, children (aged 0–6 years) and patients with hypertension, diabetes or serious mental illness; (v) surveillance and control of infectious diseases and public health emergencies and (vi) sanitation control and monitoring.²³ Since 2010, the adoption of a national essential drug list (EDL) with government-imposed price control has been mandatory at all primary care facilities.^{25–27} The implementation of EDL aimed to ensure the procurement, pricing, financing and quality of medicines to improve drug efficacy, safety and cost-effectiveness.

The most recent policy stated by the central government in 2015 has re-depicted the structure of the overall healthcare system to enhance the healthcare accessibility and equity, through a step-wise manner with dual referral channels between primary care and secondary (tertiary) care (Fig. 1).²⁷ Multiple

Table 1 Twenty official guidelines and document milestones in China's primary care reform

Year	Policy highlights
1997	The Central Committee of the Communist Party (CCP) of China and the State Council called for an initiative to re-strengthen primary care across China. The overall strategy aimed to reform the urban healthcare system, develop community health services and establish a functional and convenient primary care network. ⁸
1998	The State Council pointed out that the allocation of health care resources should be optimized, with a priority in community health care, where items on essential treatment should be included in the basic medical insurance coverage. ⁹
1999	The Ministry of Health (MoH), together with nine other authorities, jointly announced the guidance on primary care reform through developing CHS. It put forward the concept of CHS, which included prevention, treatment, protection, rehabilitation, education, and family planning, i.e. a six-in-one care package. ¹⁰
2000	The MoH outlined the definition of general practice (GP). It called for multiple strategies of GP education with a focus on in-service training to enrich the front-line GP practitioners and develop a cadre of senior GP practitioners to provide CHS in primary care. ¹¹
2000	The State Council emphasized that there should be a well-coordinated division of labour among community health care facilities, large-scale comprehensive hospitals, and specialist hospitals. Attention should be paid to the role of primary care facilities in prevention, protection, education and psychological counselling. ¹²
2002	The MoH, together with ten other authorities, jointly regulated the structure of CHS provider, registration and operation of CHS facilities, as well as service pricing, regulation, and supervision. It aimed to accelerate the CHS development. ¹³
2006	The State Council re-announced the action plan of progressing urban CHS. It highlighted equity, efficiency, and accessibility in primary care. Multiple organizational models of community health centres (CHCs) were encouraged. The government should play a central role in building primary care, with the active participation from the social and private sector. ¹⁴
2006	The MoH regulated the public health service package and essential healthcare service items delivered by CHCs. ¹⁵
2006	The MoH regulated basic requirement of department, staffing, housing, equipment in CHCs and its subordinate health stations. ¹⁶
2006	The MoH and four other ministries jointly urged the integration of GP essential knowledge and expertise into the whole process of medical education to undergraduate-level medical students. The GP training scheme was structured and included class-based learning, clinical rotation and community practice in primary care medicine. Guidelines on GP workforce recruitment, evaluation and retention were also developed. ¹⁷
2006	The MoH recommended that there should be at least one CHC per 30 000 populations. It also encouraged multiple providers including government, hospitals and social investors. ¹⁸
2006	The document encouraged launching department of GP/Family Medicine in tertiary medical universities to build a cohesive undergraduate medical curriculum, a standardized post-graduate professional training and continuing education for GPs. ¹⁹
2009	The State Council pointed out that the weakness in public health, rural medical care and urban community health care should be addressed. The urban healthcare network should be underpinned by primary care, and CHCs should deliver public health services and primary medical care for commonly and frequently seen disease, and long-term conditions with rehabilitation services. ²⁰
2009	The State Council highlighted that the improvement of primary care network and equitable health care for all citizens as priorities in the healthcare reform implementation. A 3-year plan was launched to provide competent primary care workforce for rural village clinics, township health centres and community health centres and stations. ²¹
2011	The State Council advised that GP system should be established gradually to provide first contact of care at grass roots level. GPs should receive 5-year undergraduate-level clinical medical education, followed by 3-year post-graduate GP standardized training. It also encouraged GPs to deliver primary care in a team approach. ²²

Table continues

Table 1 Continued

Year	Policy highlights
2011	The MoH advised a comprehensive package of basic public health (BPH) services to enhance the capacity of disease prevention and health promotion in primary care settings. ²³
2011	The MoH formulated the evaluation of primary care service provisions at community healthcare facilities. Organizational management, BPH services essential medical care quality were assessed. ²⁴
2013	The State Council advised the focus of ongoing healthcare reform on consolidating essential drug list system and exploring operational structure of primary healthcare facilities. It required active involvement from the government sector and more benefits given to primary care workforce. ²⁵
2014	The State Council iterated the direction to carry forward the healthcare reform. It called for policies to encourage first contact of care at CHCs. Coordination between cares at different levels were highlighted. One goal was to build up a system structured in a step-wise manner with improved dual referral channels bridged between primary care and secondary (tertiary) care. ²⁶
2015	The State Council issued its most recent national healthcare policy. It aimed to establish a nation-wide primary care system, with regular updated 'cloud' big data with respect to population demographics, electronic health profiles and patient medical records available by 2020. It also highlighted the pivotal role of primary care in chronic disease prevention, treatment and rehabilitation. ²⁷

The long-existing Ministry of Health (MoH) and the National Population and Family Planning Commission (NPFPC) have been merged into, and reconstituted as, the National Health and Family Planning Commission (NHFPCC) of the P.R. China in March 2013. The NHFPCC is expected to strengthen the supervision of healthcare institutions and professionals to regulate service provisions and deepen the current healthcare and primary care reform to address grass roots health issues. The reference numbers are consistent with that in the manuscript text.

organizational models of CHCs were encouraged. The construction of a nation-wide 'cloud' big data system has been in progress. It is expected to be completed by 2020 to support chronic disease management at primary care with a dynamic picture of the nation-wide population health profiles.²⁷

Service provision and human resources

Primary care facilities in urban areas are organized around CHCs. The national statistics have revealed the expansion of CHCs and subordinate health stations policies in the past decade. Compared with a 1.38-fold increase in hospital constructions between 2002 and 2013, there was a dramatic increase by 3.30-fold in the number of CHCs from 2002 to 2007 (8211 versus 27 069), followed by a mild increase from 2010 to 2013 by which the number of CHCs exceeded that of hospitals (33 965 versus 24 709) (Fig. 2A). However, the national statistics on the healthcare utilisation did not prove that CHCs care has been commensurately improved in response to the increasing healthcare need of the population. The total million person-time of diagnosis and

treatment at the upper level remained far exceeding than that at CHC level (1243 versus 75 million in 2002; 2742 versus 657 million in 2013), albeit the CHCs showed a remarkable pace of increase (8.73-fold [657/75] versus 2.21-fold [2742 /1243]) (Fig. 2B).

The service provision at CHCs adheres to national guidelines, and all primary care providers are regulated by the local health bureau to ensure the quality of services.^{10,13,15,16,23} This includes the standard provision of both western and traditional Chinese medicine services that are available in most CHCs. In general, all CHC health care staff are paid a fixed salary plus a CHC annual income-related floating salary. Patients can walk in directly to see a doctor at CHCs after paying a fixed one-off registration fee upon the visit. Healthcare personnel at CHCs include clinical physicians, public health doctors, registered nurses, pharmacists, laboratory technologists, managerial and assistant staff. Telephone access as well as evening and weekend clinics are commonly available. A novel concept of GP team-based service provision enrolling community residents with the GP teams has been recently promoted since 2011.²⁸ This approach

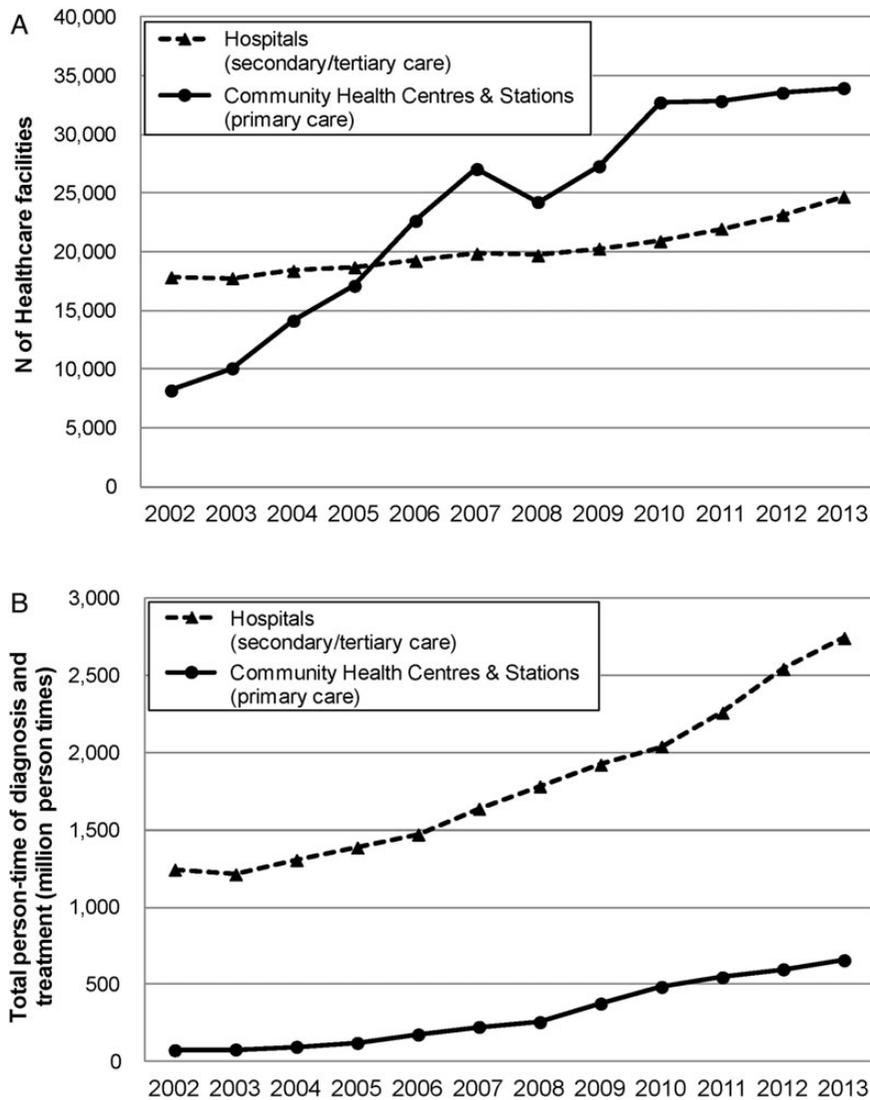


Fig. 2 Number of healthcare facilities with total person-time of diagnosis and treatment between 2002 and 2013 in China. All statistics were retrieved and calculated (when necessary) from the China Health Statistics Yearbook (renamed as China Health and Family Planning Statistics Yearbook, since 2013), which are official healthcare report series compiled by the National Health Family Planning Commission (NHFPC), P.R. China. Historical statistics on the number of total community health centres and stations are only available from 2002.

requires CHCs to form GP-led team consisting of GPs, nurses and sometimes public health doctors to provide continuous and comprehensive services to residents enrolled, normally with a maximum of 2500 registrations per team. It was reported that patients who contracted with GP team service had greater satisfaction.²⁹ Another recent longitudinal study

found that capitation payments and the provision of services tailored to the local health priorities served as key factors associated with beneficial long-term relationships between patients and CHCs.²⁸ It suggests that the reforms of incentive structures should be reinforced to explore effective and viable payment methods for improving primary care performance.

Table 2 Ten-year development of primary care between 2002 and 2013 in China

	2002	2005	2009	2011	2013
Total population, <i>n</i>	1 284 530 000	1 307 560 000	1 334 500 000	1 347 350 000	1 360 720 000
Health personnel in the health system					
Total personnel, <i>n</i>	6 528 674	6 447 246	7 781 448	8 616 040	9 790 483
Medical practitioners, <i>n</i>	1 843 995	2 042 135	2 329 206	2 466 094	2 794 754
Registered nurses, <i>n</i>	1 246 545	1 349 589	1 854 818	2 244 020	2 783 121
Pharmacists, <i>n</i>	357 659	349 533	341 910	363 993	395 578
Laboratory technologists, <i>n</i>	209 144	211 495	220 695	238 874	266 607
Healthcare facilities					
Total hospitals (secondary/tertiary care), <i>n</i>	17 844	18 703	20 291	21 979	24 709
Total CHCs (primary care), <i>n</i>	8211	17 128	27 308	32 860	33 965
Health personnel in the CHCs					
Medical practitioners, <i>n</i>	19 451	39 964	109 734	158 554	173 838
Registered nurses, <i>n</i>	10 842	23 545	79 711	119 834	139 104
Pharmacists, <i>n</i>	3946	7720	20 015	29 743	32 438
Laboratory technologists, <i>n</i>	1521	3256	8879	12 990	13 871
Education level of CHC medical practitioners					
Bachelor's education or above, %	13.0	21.9	30.7	31.7	37.1
Secondary (technical) school or junior college education, %	77.9	70.2	65.5	64.6	59.8
High school education or lower, %	9.1	7.9	3.8	3.7	3.1
Healthcare utilization in the CHCs					
Daily clinical consultations per doctor, %	12.5	13.7	14.0	14.0	15.7

All statistics were retrieved and calculated (when necessary) from the China Health Statistics Yearbook (renamed as China Health and Family Planning Statistics Yearbook, since 2013), which are official healthcare report series compiled by the National Health and Family Planning Commission (NHFPC), P.R. China. Historical statistics on the number of total community health centres and stations are only available from 2002. CHCs, community health centres (including the subordinate community health stations).

The enhanced service provision also resulted from the rising number of medical practitioners working at CHCs (173 838 in 2013 versus 19 451 in 2002). Since 2002, the number of daily clinical consultations per doctor at CHCs has increased by 25.6% (15.7 versus 12.5 in 2013). More than one-third (37.1%) of CHC medical practitioners had a bachelor's degree or above, in contrast with the education level of CHC medical practitioners in 2002 when it was slightly over 1 in 10 (13.0%) who had completed undergraduate education (Table 2).

Patients' experiences

The Chinese version of Primary Care Assessment Tool-Adult Edition (PCAT-AE) has been used to evaluate the process of primary care delivery measured by patients' experiences.³⁰⁻³² The concept of patients' experiences was contextualized on the basis

of the five core attributes of primary care, i.e. first contact, continuity, coordination, comprehensiveness and community centredness from an international perspective.³³ The PCAT focuses on patients' experience of, rather than satisfaction with, healthcare delivery, which could minimize subjective bias that is due to socio-demographic variations and patient expectation.^{34,35} The PCAT items in each core domain are scored according to a 4-point Likert-type scale, with higher scores indicating better primary care experiences.³¹

Generalists at CHCs were more likely to provide better primary care, compared with specialists at outpatient department in hospitals.³⁰ In one large study conducted in seven geographical regions, approximate one-third (33.4%) of patients reported an optimum PCAT score (higher than the third quantile of the score range) on the overall primary care

experience. The proportion of subjects with optimum scores in individual primary care domains ranged from 62.1% in the comprehensiveness of service attribute to only 16.6% in the community orientation attribute.³¹ This may be a reflection of the current clinical practice where major attention is paid to disease treatment *per se* and less to patients' personal beliefs, health attitudes and lifestyle changes. Accordingly, the outreach work such as door-to-door visits, early screening and disease prevention are considered less cost-effective, compared with on-site physician treatment and drug prescriptions.

It was also found that patients with social medical insurance were more likely to have optimum scores in most of the primary care attributes and reported overall better primary care experience.³¹ The rapid escalation of healthcare costs in recent decades and the incomplete coverage of health insurance may partly contribute to the healthcare inequality. Uninsured patients, most of which belong to internal migrants,³⁶ probably have poorer access to or can less afford comprehensive care and appropriate investigations within primary care and between levels of care, resulting from being less able to pay. The primary care experience was therefore substantially worsened for lower income and vulnerable groups. This suggests an urgent need to understand and address how medical insurance coverage may affect CHC service utilization, as it also applies to those who are insured. Outpatient costs in CHCs are usually deducted from the personal saving account, while only inpatient costs can be claimed from the pooled insurance fund. The personal account, however, is quite limited. Therefore, high out-of-pocket payments for health care are common, especially when having chronic conditions that require long-term care such as diabetes and hypertension. It has been reported that people with higher per capita household income tended to report slightly more chronic conditions, probably as a result of unaffordability and inadequate use of health care.³⁷ This may prevent the vast majority of more socioeconomically deprived populations from prevention and treatment. One strategy being implemented in China is the expansion of social medical insurance coverage and the reduction of co-sharing

in the individual's contribution.^{25,26} In the UK, it has been shown that greater investments in primary care and targeting poorer areas result in more equity. In China, the reform on the financing mechanisms to optimize healthcare investment in primary care requires long-term investigation on the relationships of primary care cost and patients' experiences to inform healthcare decision-making.

Service utilization

The development of CHCs is expected to alleviate over-utilization of secondary (and tertiary) care through a primary care approach to tackle frequently encountered medical conditions, common minor diseases and chronic conditions at the community level. A detailed service utilization pattern was shown in one large study conducted in southern China.³¹ Almost 9 in 10 (85.6%) patients reported a moderate-to-strong affiliation with a regularly visited CHC as their primary care provider. However, as doctor-patient pre-registration is not mandatory, nearly two-thirds of patients chose to visit different doctors within the CHCs. Treatment of acute medical conditions was the most frequent reason for clinic attendance, followed by diagnosis and follow-up of long-term conditions.

Unlike the UK, referral from primary care doctors to hospital specialists (secondary care providers) is encouraged but not mandatory in China. Studies have shown that patients tended to seek services directly at secondary specialist care,^{37,38} which is likely to be costly and duplicative, compared with primary care. This implied a widened divide between primary care and secondary care in the past decades in China, with secondary care played a dominant role in service provision. The challenge of shifting health system development from specialist care towards generalist community-based care is momentous. The dichotomy between the dual referral channels between primary care and secondary care should be bridged within a properly designed delivery system, such that hospitals could refer patients back to the CHCs for prevention and rehabilitation, instead of keeping a high volume of patients to generate revenue in competition with primary care facilities. Encouraging CHC utilization as the regular source

of care through incentives on preferential reimbursement rate at CHCs may serve as an immediate solution. However, a high level of service competency with public trust in primary care is fundamental. Factors that could largely influence the willingness to attending CHCs may also include the familiarity with healthcare staff, communication with doctors, facilities and environment, as well as previous experiences of service utilization.^{39–41} This may also require further improvement in CHC service provision within the wider environmental context of personal and social care to address all aspects of wellness of patients' and their family members, encouraging active community participation in the primary care management and priority setting. Studies also indicated considerable room for improvement in job satisfaction with respect to career development, peer recognition, as well as wages and benefits among CHCs workforce to ensure a stable and sustainable development of primary care.^{42,43}

Primary care organizational models

Given the diversified socioeconomic background across urban areas, national policies^{14,18,26} have encouraged local attempts to build up CHCs under different models of ownership and management. Three main categories of CHC models have emerged, including (i) government-owned and -managed CHCs (G-CHCs); (ii) government-owned and hospital-managed CHCs (H-CHCs) and (iii) privately owned and managed CHCs (P-CHCs).^{2,44} The government report showed that 36.5% of the CHCs were G-CHCs, 35.7% were H-CHCs and 27.8% were P-CHCs.⁴⁵ Details on the organizational models were described in both quantitative and qualitative studies elsewhere.^{44,46} The G-CHCs are organized as part of the government sector. The typical G-CHCs operate in a way that the revenue generated at the CHCs (mainly from medical treatment and drug sales) goes to the local government finance, whereas the CHC expenditures (mainly on premises, equipments and staff remuneration) are paid directly by the local government. The H-CHCs are organized as an affiliated outreach clinical department within the host hospital, in dependent of the government sector. They receive limited subsidies from the government via the host hospital,

and the CHC revenue are self-retained and managed, acting as financially self-sufficient healthcare facilities. P-CHCs are built upon social and private investment, managed by private organizations. They are independent of either the government sector or the hospital system and in general hardly receive subsidies from government or hospitals. Financially, self-sufficiency and profit seeking are major characteristics of P-CHCs. These primary care organizational models^{44,46} reflect a varying extent of government and hospital involvement, and their respective roles in delivering primary care.

The ownership and management models of CHCs and the impacts of this on quality of care have been examined.^{44,47} Patients with G-CHCs as the usual source of primary care had the highest experience scores compared with those visiting H-CHCs and P-CHCs, as a result of better first-contact care and coordination of care. This suggests that the gatekeeping function of CHCs could be positively enforced by giving preferential reimbursement rates for healthcare episodes for which first attendance is at CHCs. The higher primary care experience score for the coordination domain in G-CHCs implied that the government-dominant top-down approach to delivering primary care was the most effective, particularly at making multi-sectoral service connections between different levels within the health system. Thus, G-CHCs may be able to better solve the problems of constructing primary care services as the first-contact point of care, one of the key conundrums for China's healthcare reforms.⁴⁴ It was also reported that patients at G-CHCs were more likely to have optimal blood pressure control, while those with P-CHCs were less likely to achieve blood pressure control, irrespective of the prescriptions of anti-hypertensive drugs.⁴⁷ Thus far, existing evidence suggests that G-CHCs may lead to better primary care process⁴⁴ and outcomes,⁴⁷ as the model has strengths in that it reduces socioeconomic inequality and results in better distribution of health resources. The recently proposed 'cloud' big data plan by 2020²⁷ is envisaged to illustrate the extent to which primary care physicians follow the clinical practice recommendations and meet guideline targets.⁴⁸ To use this effectively will require greater inter-department collaboration,

interface exchange between systems and a joint effort involving all stakeholders across healthcare sectors. Further in-depth exploration of primary care organizational models could ultimately lead to the elucidation of how the primary care workforce can be expanded and made more effective in the delivery of primary care in China.

Disease treatment and management

Inappropriate and excessive drug use has been common in China, particularly the prescription of antibiotics without guidance. Data exhibited that the antibiotics on average accounted for more than one-fifth (22.8%) of the total drug sales, and antibiotics were included in more than half of the outpatient visit prescription records. However, only <40% (39.4%) of these prescriptions were deemed properly.⁴⁹ New and broad-spectrum antibiotics, combinations of multiple antibiotics, prolonged antibiotic use and intravenous antibiotic administration were favoured, which may lead to many errors in antibiotic usage.⁴⁹ Another nation-wide survey illustrated that patients attending G-CHCs were less likely to receive intravenous injection therapies and antibiotics treatments, compared with those receiving prescriptions at P-CHCs.⁵⁰ In the G-CHC settings where physicians' salary and CHC revenue from consultations and prescriptions are separate, it is possible that physicians are less likely to prescribe unnecessary drugs. Thus, pharmacotherapy may not be perceived as a must during patient encounters when elevation in blood pressure was only marginal which could be managed with educational and lifestyle modification counselling before drug treatment.^{47,51} This may reduce the possibility of undesired side effects and complications and thus resulting in favourable clinical outcomes.

The provision of maternal and child care is one of the major functions of CHCs, and the utilization of CHCs instead of secondary hospitals for maternal and child care has been promoted. Most CHCs require community residents to bring their newborn infants for CHCs attendance at scheduled intervals for 6 months after birth, with regular reminders from the community healthcare staff. In contrast, the formal follow-up procedure is generally unavailable at

hospital outpatient clinics. Longitudinal data showed that the CHCs could provide better health care, with respect to higher breastfeeding rate and lower prevalence of lower respiratory tract infection, compared with hospital outpatient clinics.⁵² The concept of using CHCs as the platform for hypertension management has also been put into practice. Studies have manifested the effectiveness of programmes delivered by CHCs in achieving higher blood pressure control rate and reduced 10-year risk of cardiovascular diseases in community patient population.^{53–55}

Tackling long-term conditions

China, like many other countries, is also undergoing an explosion in the burden of chronic diseases due to unprecedented economic and environmental changes. Multimorbidity—defined as the co-existence of two or more long-term conditions in one individual—is increasingly common in the UK.⁵⁶ Across the globe in China, similar challenges exist and CHCs are expected to be responsible for tackling chronic diseases at the community level. A recent study examined the prevalence of multimorbidity across a selection of 40 chronic morbidities in a large representative sample of the Chinese population. Overall, more than one in 10 of the general population of all ages have multimorbidity, and its prevalence increased significantly with ageing.³⁷ Unhealthy lifestyle behaviours including smoking, alcohol drinking, salty diet and physical inactivity were commonly reported as risk factors, while ageing, urbanization and increase in prosperity may contribute as underlying key drivers.⁷

Similar to western developed countries, the growing issue of multimorbidity in China also leads to greater use of healthcare resources, as shown in a recently published multi-country analysis among China, Scotland and Hong Kong, where the healthcare systems are differently organized.⁵⁷ The use of healthcare resources among multimorbid patients was clearly driven by the ability to pay in healthcare system where universal coverage has not yet been established and primary care is still being developed (such as China). The challenge of overcoming healthcare disparities requires strategies that seek to strengthen CHCs and make the primary care

universally equitable and effective.^{2,58} Developing and amplifying the effectiveness of the primary care workforce^{59,60} should be a top priority, as a properly trained and adequately resourced primary care system could substantially reduce cardiovascular and other risks.⁵³ At this stage, however, CHCs in China are still far from acting as a first-contact point and regular source of care. The need for a cadre of well-trained and motivated GPs who are qualified from a strong and contextualized education and training system is substantial.^{38,61,62}

Strengths and weaknesses of the review

In this review, we outlined the development of urban CHCs under the national health care policies with respect to the CHC structure and delivery models, and the impact of primary care reform on key issues based on the most recent empirical evidence. There are several limitations. First, a comprehensive meta-analysis synthesizing quantitative data was not performed due to limited number of studies included for each outcome in this review. Second, the information published in Chinese language were only retrieved from central government documents and official statistics wherein major progress of primary care was fully documented with high-quality evidence. Third, the complexity of China's healthcare system may affect the generalizability of the findings reviewed as national policy implementation could be decentralized at provincial authorities. It is also worthy of note that themes covered in this review were based on panel discussion, and thus, selection bias may exist, albeit the searches of literature were conducted in a systematic manner. Nevertheless, a wide range of topics were highlighted, including CHC structures, human resources and financing, service utilization, primary care organizational models, patients' experiences, antibiotics use, hypertension management, improvement of maternal and child care, where rapid development has been observed.

Conclusion

The past decade has witnessed a journey of booming development in primary care and laudable achievements in building the CHC infrastructure with

sustainable policy support in China. The road towards a strong primary care-led system is promising but challenging. The rapid escalation of health-care costs with incomplete coverage of medical insurance may partly lead to the inequality in primary care experiences. The vast regional differences with substantial divides in health between socioeconomic strata require quality primary care to reduce healthcare disparities, especially in light of an ageing population and emerging burden of multimorbidity. Despite progress, primary care is still weak in China. The trade-off between governments and markets under China's decentralized healthcare system will largely determine the extent to which primary care promotes health equity and service cohesion. Enhancing CHCs as the first-contact point and regular source of equitable care for patients with respect to the key quality attributes including first contact, coordination, continuity, comprehensiveness, as well as family and community centredness would appear to be a top priority.

Authors' contributions

S.M.G. conceived this review and provided overall guidance. H.H.X.W. and J.J.W. reviewed the Chinese government documents and official statistics from 1997 to September 2015. H.H.X.W., J.J.W., S.Y.S.W. and M.C.S.W. contributed to the literature search in NCBI PubMed. H.H.X.W. wrote the first draft. All authors (H.H.X.W., J.J.W., S.Y.S.W., M.C.S.W., S.W.M. and S.M.G.) contributed to the feedback on review results and writing of the final report.

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Supplementary material

Supplementary material is available at *BRIMED* online.

Conflict of interest statement

The authors have no potential conflicts of interest.

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