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Is training policy for general practitioners in China charting the right path forward? a mixed methods analysis

Jianwei Shi ,[1,2] Qingfeng Du,[3] Xin Gong,[4] Chunhua Chi,[5] Jiaoling Huang ,[1] Wenya Yu,[1] Rui Liu,[6] Chen Chen,[7] Li Luo,[8] Dehua Yu,[2,9] Hua Jin,[2,9] Yan Yang,[10] Ning Chen,[11] Qian Liu,[10] Zhaoxin Wang [1,2]

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For numbered affiliations see end of article.

Correspondence to
Dr Zhaoxin Wang;
supercell002@sina.com

ABSTRACT

Objectives Since 2010, the Chinese government has gradually increased its investment in the training of general practitioners (GPs) to support their role as 'gatekeepers' in the healthcare system. However, this training is still organised from the perspective of specialist care. We aimed to assess the appropriateness of the principal GP admission training programme curricula in China, including Residents Training for GPs (RTGP), Residents Training for Assistant GPs (RTAGP) and Training for Specialists with General Practice interest (TSGP).

Setting The study focussed on GP training programmes in Shanghai, China.

Participants Data on disease competences developed in three GP clinical training programmes (RTGP, RTAGP and TSGP) were derived from official programme training manuals. Data on the proportion of outpatient visits for each disease were taken from the Shanghai community healthcare centres grassroots outpatient database.

Primary and secondary outcome measures We first conducted a quantitative analysis by comparing the structure of current training curricula with actual outpatient utilisation patterns across all community healthcare institutions in Shanghai from 2014 to 2018. Qualitative analysis was then conducted to evaluate GP training programmes based on Donabedian's model.

Results Quantitative analysis showed that the distribution of diseases for which competences were taught did not match the composition of outpatient visits in community healthcare institutions. Concerns identified through qualitative analysis included teachers who were mostly specialists, lack of equipment for differential diagnosis in community healthcare institutions, insufficient teaching of referral standards and GP training in large hospitals that consistently neglected communication skills.

Conclusions The establishment and implementation of admission training programmes for GPs in China lacks a focus on general practice training and may be improved by adopting an evidence-based general perspective aligned with the medical needs of the community.

Strengths and limitations of this study

- Existing research on general practitioner (GP) admission training in China consists mainly of qualitative studies of training schemes and modules.
- Data were derived from programme training manuals formulated by the national government and the Shanghai grassroots outpatient database, and data quality was high.
- Based on the findings of this study, establishment and implementation of admission training programmes for GPs should be aligned with the medical needs of the community from an evidence-based perspective.

INTRODUCTION

Primary care plays a central role in the healthcare system. High-quality training for general practitioners (GPs) is essential for effective primary care, and standardised training is the primary path for ensuring a sufficient supply of high-quality GPs.[1 2] In Great Britain, GP training is based on a '5+2+3+X' scheme, including a 5-year undergraduate education in general practice, a 2-year foundation training and a 3-year standardised residency training, as well as regular renewal of medical skills after becoming a GP.[3] In the USA, GP training follows a '4+4+3' scheme, with a 4-year undergraduate education, a 4-year medical school education and a 3-year standardised residency training with strict requirements and assessment standards.[4] In Australia, a '4+2+4' scheme is used, including 4 years of medical education, 2 or more years of prevocational training and 4 years of general practice (table 1). After completion of a course test, GPs are eligible for membership in the Royal Australia College of General Practitioners or the Australia College of Rural and Remote Medicine.[5] Overall, the education systems described above have become mature and have cultivated a high-quality GP workforce in their respective countries.[4 5]

GP training in China lags behind that in other industrialised countries. Community healthcare institutions in China have been weakened in the wake of problems

Table 1 Comparison of GP admission training programmes between China and other developed countries

Country	Training structure	Target population	Characteristics
Great Britain	5+2+3	Undergraduate	Five-year undergraduate education in general practice, 2-year foundation training, 3-year standardised residency training
USA	4+4+3	Undergraduate	Four-year non-medical undergraduate education, 4-year medical school education, 3-year standardised residency training
Australia	4+2+4	Undergraduate	Four-year medical education, 2 or more years prevocational training, 4 years of general practice
	4+2+4+1 (rural)	Undergraduate	One additional year based on the above training if practicing in rural areas
China	5+3 (RTGP for urban areas)	Undergraduate with Bachelor's degree	Five-year medical education (together with other medical students), 3-year standardised residency training in general practice
	3+2 (RTAGP for rural areas)	College degree, rural physicians	Three years of medical education, 2-year standardised residency training in general practice
	TSGP	Specialist physicians already practicing	12 months of training for specialists to become certified as GPs

GPs, general practitioners; RTAGP, Residents Training for Assistant GPs; RTGP, Residents Training for GPs; TSGP, Training for Specialists with General Practice interest.

accompanying China's health reform in the 1990s, and secondary or tertiary public hospitals are nearly always patients' first choice. To address this issue, reforms have been instituted with the goal of increasing the supply of GPs and improving their skills.[6 7] Drawing on the experience of Western countries, the China Health Ministry proposed its framework for general practice education in 2000. Since then, China has begun to develop its GP admission training system nationally; the system includes a 5-year undergraduate education (including traditional Chinese medicine) plus a 3-year standardised training of GPs.[8] However, the contents and practice of standardised training are characterised by several differences from specialist training, and the standardised training system for GPs (named Residents Training for GPs, RTGP) was not formally implemented until July 2011.[9 10] In addition to the typical '5+3' RTGP scheme similar to that used in Western countries, the Chinese government has also provided some special solutions, such as Resident Training for Assistant GPs (RTAGP), which was begun in 2012 to increase the supply of assistant GPs in suburban regions.[11] This programme is for medical students with a 3-year college degree and requires a 2-year course of standardised training after graduation. Moreover, the Training for Specialists with General Practice interest (TSGP) has been developed as a supplement to improve the size of the GP workforce through on-the-job training for specialist physicians in general practice. However, this kind of admission training is not consistently structured across different regions in China. Although TSGP was initiated in 2010, a formal training scheme including a structured breakdown of time devoted to specific diseases and departmental rotations was not established until 2019.[12] In the wake of these developments, many studies showed that citizens still had a very low level of trust in the healthcare system.[4–6] The components of training generally cover disease treatment, prevention and communication skills. The programmes require that GPs perform rotations in each specialised department of a qualified standardised training base (tertiary hospital), along with other requirements for specific departments and diseases, which also form the core content of the standardised training for resident physicians. GP training programmes in community healthcare institutions focus mostly on prevention, disease management and health education from a public health perspective. Training received in tertiary hospitals thus makes up the majority of training time for GPs.[8] Current research on GP training in China consists mainly of qualitative analysis of different training schemes or modules,[13–15] and few studies have systematically evaluated the content and implementation of admission training programmes aiming to increase the supply and quality of primary care providers in China.[8]

In this study, we used a mixed methods approach to evaluate admission training of GPs in China, focussing on weaknesses regarding disease treatment training in tertiary hospitals. We first used matching analysis to evaluate the composition of national standard admission training programmes, comparing the disease competences covered against actual health utilisation patterns of the local population based on outpatient visits during 2014 to 2018. Second, we conducted qualitative interviews with GPs who had gone through different types of admission training in order to elicit their views on the establishment and implementation of training programmes, including theoretical, clinical and practical components.

METHODS

Analytical framework

This study used both quantitative and qualitative methods. The principal aim of the quantitative analysis was to

determine whether the proportion and rank of competences developed for various diseases in different types of admission training programmes were consistent with the proportion of outpatient visits for frequently-occurring diseases among community residents in Shanghai. The qualitative component of the study was based on Donabedian's framework[16] and evaluated whether the contents and implementation of admission training programmes were appropriate by interviewing GPs who had each gone through one of the three principal training programmes.

Data sources

Data on disease competences developed in three GP clinical training programmes (RTGP, RTAGP and TSGP) were derived from the programme training manuals formulated by the national government. Data on the proportion of outpatient visits for each disease in Shanghai community healthcare centres were taken from the Shanghai grassroots outpatient database, managed by the Shanghai Municipal Health Commission. Principal construction of the database was completed in 2012, and data have been stable and accurate since 2014.[17] The present study included information on all outpatient visits to all community healthcare institutions in Shanghai from 2014 to 2018, during which there were 40 million outpatient visits. The number of visits for each disease was calculated based on disease diagnoses. Multiple visits by the same patient for a given disease within the study period were counted multiple times.

The GPs interviewed for the qualitative portion of the study were recruited using a multi-stage sampling approach. First, two districts were selected, and three community healthcare institutions were chosen from each district, for a total of six community healthcare institutions. We conducted informational surveys with GPs in the six community healthcare centres before the interviews. The survey included the number of GPs in each community, the kind of standardised training they obtained, their title and willingness to complete the interview. GPs were screened based on the following inclusion criteria: GPs who had each gone through one of the three standardised GP training programmes and had been working for at least 2 years, awareness and serious attitude regarding standardised GP training, interest in the study and agreement with the significance of the study. We selected four GPs meeting inclusion criteria as respondents from each community healthcare centre (24 GPs in total). Finally, we convened the 24 GPs to a meeting and gave them a detailed introduction to the significance, purpose, methods and content of the study.

The Donabedian model was used as an a priori organisational framework. Interviews focussed on establishment and implementation of GP admission training programmes, and the interview guide included three major domains: (1) biographical information and experience (eg, age, gender, professional title); (2) experiences of trainees in standardised GP training programmes (eg, rotation situation); and (3) deficiencies experienced in standardised GP training programmes (eg, "Overall, can you identify any defects of the program combined with your current working needs?"), programme structure, teaching methods and training contents regarding diagnosis and treatment. The interview questions were open-ended. All interviewees provided informed consent. In-depth face-to-face qualitative interviews were conducted from January and June 2019 by our research team. GPs were interviewed on a one-to-one basis in each community healthcare centre.

Statistical analysis

For quantitative analysis, we compared the time devoted to different disease competences taught in the three GP admission training programmes with the proportion of disease diagnoses for outpatient visits to Shanghai community health centres. As diseases in the training programmes are referred to using common disease names rather than International Classification of Diseases (ICD) codes, we invited three experienced GPs to classify the diseases in these training programmes according to ICD-10 codes; consensus was reached following two rounds of coding. The actual visit proportion for each disease was calculated as the number of visits for which the disease appeared as a diagnosis, divided by the total number of visits for the relevant body system (eg, cardiovascular system). In this study, we considered only the primary diagnosis since other diagnoses were not included in the outpatient database. The proportion of training time devoted to each disease in the three training programmes was compared against the proportion of actual primary care visits for each disease. For the qualitative analysis, two trained researchers (the project coordinator and one graduate research assistant) reviewed and coded the data in line with the exploratory research aims and using the interview guide domains as an a priori organisational framework. A hierarchical coding structure was used, in which all themes deductively identified by the researchers were coded in the codebook as subcodes of their respective a priori interview guide domain parent codes. The codebook with thematic code definitions and examples was created using NVivo 10 software. The transcript was double coded and results from the two researchers were compared and discussed until consensus was reached. Thematic development and coding occurred concurrently with ongoing interviews. The lack of new coded themes after two consecutive transcripts for a given research topic indicated that the interviews had reached saturation, and no further interviews were conducted on the topic. Feedback on the codebook and results was gathered from all investigators to minimise misinterpretation.

Patient and public involvement

Patients and the public were not involved in the study design or in the recruitment to or conduct of the study.

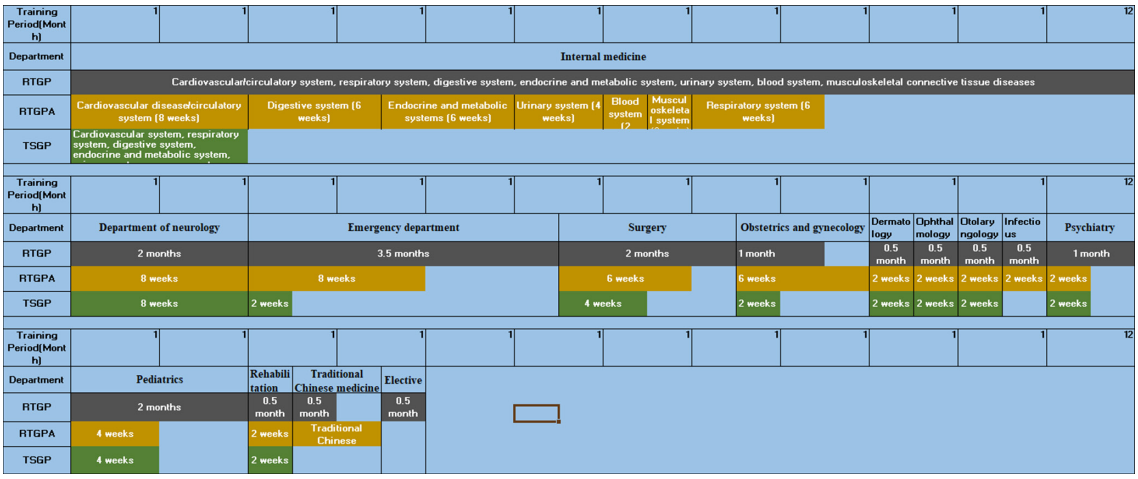

Figure 1 Department and rotation time in three general practitioner admission training programmes. RTGP, Residents Training for General Practitioners; RTAGP, Residents Training for Assistant General Practitioners; TSGP, Training for Specialists with General Practice interest.

Role of the funding source

The study funders had no role in this study. The corresponding author had full access to data and had final responsibility for the decision to submit for publication.

RESULTS

Quantitative analysis

Departmental rotations in GP training programmes in tertiary hospitals

Clinical rotation practice lasted for a total of 27 months in the RTGP programme (figure 1). The greatest amount of time was spent in internal medicine (12 months, 44%), followed by the emergency department (3.5 months, 13%), with time spent in other departments such as neurology, paediatrics and surgery ranging from 0.5 months to 2 months. For the RTAGP, the total rotation time is 84 weeks. As with the RTGP programme, the most time was spent in internal medicine (40%), followed by neurology (9.5%) and emergency medicine (9.5%). The total training time in the TSGP programme is only 12 weeks. However, the time allocation is more flexible than in the other programmes, allowing the content to be tailored to the trainee's professional background and work experience.

Clinical disease composition in GP training programmes and actual outpatient visit proportions

Table 2 shows that the breakdown of disease competences taught in the RTGP, RTAGP and TSGP programmes, along with the actual disease breakdown of outpatient visits to GPs who had completed these programmes. The RTGP and RTAGP programmes delineate the specific amount of training time to be devoted to each disease. The actual percentages of outpatient visits for high blood pressure (57.4%) and myocardial ischaemic diseases/coronary heart disease (25.4%) were substantially higher than the percentage of training time spent on these diseases. However, visits for arrhythmia were very infrequent, constituting only 1.5% of outpatient visits for diseases of the circulatory system, whereas arrhythmia received the highest proportion of training time (42.9% in RTGP programme). In addition, other cerebrovascular diseases, such as sequelae of cerebrovascular diseases and cerebral infarction, ranked third and fourth in terms of actual percentages, but were not included in the training programmes (online supplemental table 1). Among respiratory diseases, bronchial asthma and pneumonia received a relatively high proportion of training time, whereas there were few actual visits for these conditions (1.4% and 1.3%, respectively). Among digestive diseases, visits for peptic ulcer (2.2%), gastro-oesophageal reflux disease (1.0%) and liver cirrhosis (0.2%) were much less frequent than the proportion of training time devoted to these diseases.

In the department of neurology, vascular dementia, Alzheimer's disease and Parkinson's disease accounted for a substantial proportion of visits (15.5%), but they were not compulsory diseases for training in the RTGP or RTAGP programmes. Conversely, intensive training was required for cerebral haemorrhage and subarachnoid haemorrhage, but there were relatively few visits for these conditions.

The overall proportion of diseases in the emergency department was relatively low. In the RTGP programme, the proportion of training time and the actual visit proportion for acute abdomen disease were both ranked high. Diabetic ketoacidosis (67.9%) and cerebrovascular diseases (9.4%) were also included in the RTAGP training curriculum, and these conditions held the highest actual visit proportions.

In the surgical department, the RTGP and RTAGP programmes devoted substantial time to surgical infection, lumbago pain and neck and shoulder pain. This pattern was consistent with the ranking of visits for these conditions. However, there was also a high proportion of visits for prostate disease (35.0%), but this condition was

Table 2 Disease composition in admission training programmes and actual outpatient visit proportions at community healthcare institutions in Shanghai, 2014 to 2018

		RTGP			RTAGP			TSGP		
Department*	**Disease grouping**	**Disease**	**Proportion of training time (%)†**	**Proportion of visits (%)‡**	**Disease**	**Proportion of training time (%)†**	**Proportion of visits (%)‡**	**Diseases**	**Proportion of training time (%)†**	**Proportion of visits (%)‡**
Internal medicine	Cardiovascular disease/circulatory system	Hypertension	28.6	57.4	Hypertension	33.3	57.4	Hypertension	–	57.4
		Myocardial ischaemic disease/ coronary heart disease	14.3	25.4	Myocardial ischaemic disease/ coronary heart disease	16.7	25.4	Myocardial ischaemic disease/coronary heart disease	–	25.4
		Arrhythmia	42.9	1.5	Arrhythmia	33.3	1.5	Arrhythmia	–	1.5
		Congestive heart failure	14.3	0.2	Congestive heart failure	16.7	0.2	Congestive heart failure	–	0.2
	Respiratory diseases	Upper respiratory tract infection	20.8	50.1	Upper respiratory tract infection	35.3	48.6	Upper respiratory tract infection	–	48.6
		Sleep apnoea hypopnoea syndrome	8.3	10.6	Bronchitis and chronic obstructive pulmonary disease	23.5	11.0	Bronchitis and chronic obstructive pulmonary disease	–	11.0
		Bronchitis and chronic obstructive pulmonary disease	20.8	11.0	Bronchial asthma	11.8	1.4	Bronchial asthma	–	1.4
		Bronchial asthma	20.8	1.4	Pneumonia	17.6	1.3	Pneumonia	–	1.3
		Pneumonia	20.8	1.3	Respiratory failure	11.8	0.001	Pleurisy	–	0.03
		Acute pulmonary infarction	8.3	0.002				Pulmonary heart disease	–	0.004
								Respiratory failure	–	0.001
	Diseases of digestive system	Acute and chronic gastritis	31.3	33.2	Acute and chronic gastritis	36.4	33.2	Acute and chronic gastritis	–	33.2
		Acute and chronic diarrhoea	12.5	15.3	Acute and chronic diarrhoea	18.2	15.3	Acute and chronic diarrhoea	–	15.3
		Peptic ulcer	31.3	2.2	Peptic ulcer	27.3	2.2	Cholecystitis	–	5.8
		Gastro-oesophageal reflux disease	12.5	1.0	Gastro-oesophageal reflux disease	9.1	1.0	Peptic ulcer	–	2.2
		Cirrhosis	12.5	0.2	Chronic hepatitis B and cirrhosis	9.1	0.2	Gastro-oesophageal reflux disease	–	1.0
								Cirrhosis	–	0.2
								Fatty liver	–	0.01
								Acute pancreatitis	–	0.009
	Endocrine, nutritional and metabolic diseases	Diabetes	52.6	68.6	Diabetes	41.7	68.6	Diabetes	–	68.6

Continued

Table 2 Continued

		RTGP			RTAGP			TSGP		
Department*	Disease grouping	Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Diseases	Proportion of training time (%)†	Proportion of visits (%)‡
		Dyslipidaemia and lipoproteinemia	26.3	26.6	Dyslipidaemia and lipoproteinemia	25.0	26.6	Dyslipidaemia and lipoproteinemia	–	26.6
		Hyperthyroidism (Graves' disease)	10.5	0.1	Hypothyroidism	16.7	1.2	Hypothyroidism		1.2
					Hyperthyroidism	16.7	0.06	Hyperuricemia		0.6
								Hyperthyroidism	–	0.06
	Diseases of urinary system	Chronic renal insufficiency	20.0	13.9	Chronic renal insufficiency	30.8	13.9	Chronic renal failure	–	6.7
		Gout	10.5	1.4	Urinary tract infection	38.5	0.5	Gout	–	1.4
		Urinary tract infection	40.0	0.5	Glomerulonephritis	30.8	0.5	Urinary tract infection	–	0.5
		Glomerulonephritis	40.0	0.5				Glomerulonephritis	–	0.5
								Nephrotic syndrome	–	0.2
	Haematological diseases	Anaemia	71.4	41.3	Anaemia	60.0	41.3			
		Haemorrhagic diseases	28.6	12.2	Haemorrhagic diseases	20.0	12.2			
		Acute and chronic leukaemia	–	1.2	Acute and chronic leukaemia	20.0	1.2			
	Musculoskeletal and connective tissue diseases	Rheumatoid arthritis	50.0	0.3	Rheumatoid arthritis	50.0	0.3			
		Systemic lupus erythematosus	50.0	0.03	Systemic lupus erythematosus	50.0	0.03			
Neurology	Neurological diseases	Other diseases: vascular dementia, Alzheimer's disease, Parkinson's disease, facial paralysis, migraine, trigeminal neuralgia, myasthenia gravis, epilepsy, multiple sclerosis, brain tumours, meningitis	–	15.4	Other diseases: dementia, Parkinson's disease, facial paralysis, meningitis, and so on	–	15.5	Alzheimer's disease, Parkinson's disease	–	15.5
		Haemorrhagic and ischaemic cerebrovascular diseases	15.8	9.1	Haemorrhagic and ischaemic cerebrovascular diseases	27.3	9.1	Haemorrhagic and ischaemic cerebrovascular diseases	–	9.1

Continued

Table 2 Continued

Department*	Disease grouping	RTGP			RTAGP			TSGP		
		Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Diseases	Proportion of training time (%)†	Proportion of visits (%)‡
		Atherosclerotic cerebral thrombosis and cerebral embolism	31.6	9.3	Atherosclerotic cerebral thrombosis and cerebral embolism	27.3	9.3			
		Hypertensive encephalopathy	10.5	5.8	Cerebral haemorrhage	18.2	0.001			
		Cerebral haemorrhage	15.8	0.001	Subarachnoid haemorrhage	9.1	<0.001			
		Subarachnoid haemorrhage	10.5	<0.001						
Emergency department	Damage and poisoning	Acute abdomen disease	31.3	8.7	Acute abdomen disease	16.7	8.7	Acute abdomen disease	–	8.7
		Acute airway obstruction	12.5	0.2	Poisoning and Accidental Injury	22.2	0.9	Poisoning and accidental injury	–	0.9
		Shock	12.5	0.03	Trauma	38.9	0.1	Coma	–	0.02
		Poisoning and accidental injuries (includes common poisoning, heatstroke, drowning, animal bites, stings)	12.5	0.9	Shock	11.1	0.03	High fever, headache, convulsions, acute chest pain, haemoptysis, haematemesis, haematochezia, haematuria, epistaxis, electrolyte disturbance, acid base imbalance§ and shock; critical and severe cases of various systems	–	¶
		Trauma	31.3	0.1	Coma	11.1	0.02			
	Digestive system	Upper gastrointestinal bleeding	100.0	2.2	Upper gastrointestinal bleeding	100.0	2.2			
	Cardiovascular system	Angina pectoris and acute myocardial infarction	71.4	0.07	Cerebral vascular disease	11.1	9.4			
		Cardiopulmonary cerebral resuscitation	28.6	<0.001	Acute left heart failure	11.1	0.2			

Continued

Table 2 Continued

		RTGP			RTAGP			TSGP		
Department*	Disease grouping	Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Diseases	Proportion of training time (%)†	Proportion of visits (%)‡
					Angina pectoris and acute myocardial infarction	33.3	0.07			
					Paroxysmal supraventricular tachycardia	22.2	0.01			
					Cardiopulmonary cerebral resuscitation	11.1	<0.001			
					Cardiac arrest	11.1	<0.001			
	Neurological diseases	Status epilepticus	100.0	0.009	Status epilepticus	100.0	0.01			
	Diseases of urogenital system	Acute renal failure	–	0.008				Acute renal injury	–	0.003
	Respiratory system	Spontaneous pneumothorax	33.3	0.002	Spontaneous pneumothorax	100.0	0.002	Dyspnoea	–	2.1
		Acute respiratory failure	33.3	0.001						
		Acute respiratory distress syndrome	33.3	<0.001						
	Endocrine, nutritional and metabolic diseases	–	–	–	Hypoglycaemic	50.0	0.08			
		–	–	–	Diabetes mellitus ketoacidosis	50.0	67.9			
Surgery		Prostate disease	–	35.0	Disease of prostate	–	35.0	Prostate disease	–	35.0
		Osteoarthritis and bone tumours	–	1.9	Surgical infection	–	26.2	Surgical infection	–	26.2
		Water, electrolyte and acid base imbalance§	–	0.1	Low back and leg pain and neck and shoulder pain	–	11.3	Acute cholecystitis and cholelithiasis	–	6.5
		External abdominal hernia	–	0.02	Urolithiasis	–	2.5	Dislocation of joint	–	3.1
		Surgical infection	–	26.2	Surface tumours (lipoma, sebaceous cyst)	–	0.4	Urolithiasis	–	2.5
		Low back and leg pain and neck and shoulder pain	–	11.3	Breast diseases	–	0.4	Osteoarthropathy	–	1.9

Continued

Table 2 Continued

		RTGP			RTAGP			TSGP		
Department*	**Disease grouping**	**Disease**	**Proportion of training time (%)†**	**Proportion of visits (%)‡**	**Disease**	**Proportion of training time (%)†**	**Proportion of visits (%)‡**	**Diseases**	**Proportion of training time (%)†**	**Proportion of visits (%)‡**
		Urolithiasis	–	2.5	Peripheral vascular diseases	–	0.04	Thyroid nodules	–	1.1
		Breast diseases	–	0.4	Rectal and anal disease	20.0	2.2	Burn	–	0.5
		Neck disease	–	0.3	Acute appendicitis	40.0	0.02	Cystic hyperplasia of breast	–	0.4
		Peripheral vascular diseases	–	0.045	Inguinal hernia	40.0	0.014	Fracture	–	0.2
		Acute cholecystitis and cholelithiasis	14.3	6.4				Varicose vein of lower limb	–	0.1
		Rectal and anal disease	14.3	2.2				Acute mastitis	–	0.1
		Pancreatic diseases	14.3	0.1				Appendicitis	–	0.1
		Gastric cancer, colorectal cancer and liver cancer	14.3	0.1				External abdominal hernia	–	0.02
		Appendicitis	14.3	0.1						
		Intestinal obstruction	14.3	0.02						
		Perforated peptic ulcer	14.3	0.0						
Obstetrics and gynaecology		Family planning	25.0	0.5	Inflammation of cervix and vagina	28.6	5.0	Abortion	–	7.4
		Perinatal healthcare	50.0	¶	Hysteromyoma and ovarian cyst	8.6	0.4	Inflammation of cervix and vagina	–	5.1
		Menopausal healthcare	25.0	¶	Family planning	5.7	0.2	Pelvic infection	–	5.1
					Abnormal vaginal bleeding	14.3	0.074	Menstrual disorder	–	2.3
					Gynaecological acute abdomen	5.7	0.019	Gestational diabetes	–	0.9
					Perinatal Healthcare	28.6	¶	Pregnancy induced hypertension syndrome§	–	0.9
					Menopause healthcare	8.6	¶	Hysteromyoma and ovarian cyst	–	0.4
								Family planning	–	0.2

Continued

Table 2 Continued

Department*	Disease grouping	RTGP Disease	RTGP Proportion of training time (%)†	RTGP Proportion of visits (%)‡	RTAGP Disease	RTAGP Proportion of training time (%)†	RTAGP Proportion of visits (%)‡	TSGP Diseases	TSGP Proportion of training time (%)†	TSGP Proportion of visits (%)‡
								Female genital prolapse	–	0.07
								Perinatal healthcare	–	¶
								Menopausal healthcare	–	¶
Dermatology		Eczema	15.2	46.6	Eczema	18.5	46.6			
		Contact dermatitis	15.2	13.3	Contact dermatitis	7.4	13.3			
		Skin fungal infection	15.2	12.9	Skin fungal infection	18.5	12.9			
		Herpes simplex and acute posterior ganglionitis	15.2	5.0	Herpes simplex and acute posterior ganglionitis	11.1	5.0			
		Hives	15.2	1.8	Hives	18.5	1.8			
		Acne	9.1	0.3	Psoriasis	7.4	0.3			
		Psoriasis	6.1	0.3	Wart	7.4	0.2			
		Warts	–	0.2	Drug eruption (drug dermatitis)	3.7	0.02			
		Solar dermatitis	3.0	0.026	Scabies and pubic lice	3.7	0.03			
		Drug eruption	6.1	0.021	Sexually transmitted diseases	3.7	<0.001			
		Sexually transmitted diseases	–	<0.001						
Ophthalmology		Conjunctivitis	26.3	56.7	Conjunctivitis	25.0	56.7	Conjunctivitis	–	56.7
		Cataract	26.3	19.3	Cataract	25.0	19.3	Prevent myopia	–	¶
		Glaucoma	15.8	0.9	Glaucoma	15.0	0.9	Meibomian adenitis and meibomian cysts	–	0.8
		Meibomian adenitis and meibomian cysts	31.6	0.8	Meibomian adenitis and meibomian cysts	30.0	0.8			
					Eye traumas	5.0	0.02			
Otolaryngology		Tympanitis	23.8	11.5	Tympanitis	9.1	11.5			
		Rhinitis and sinusitis	23.8	4.5	Rhinitis and sinusitis	18.2	4.5			
		Acute and chronic tonsillitis, adenoid hypertrophy	23.8	1.5	Acute laryngitis, epiglottitis	9.1	2.4			

Continued

Table 2 Continued

Department*	Disease grouping	RTGP Disease	RTGP Proportion of training time (%)†	RTGP Proportion of visits (%)‡	RTAGP Disease	RTAGP Proportion of training time (%)†	RTAGP Proportion of visits (%)‡	TSGP Diseases	TSGP Proportion of training time (%)†	TSGP Proportion of visits (%)‡
		Common tumours of the ear, nose and throat	–	0.9	Acute and chronic tonsillitis, adenoid hypertrophy	18.2	1.5			
		Sudden deafness	9.5	0.9	Sudden deafness	9.1	0.9			
		Nasal trauma and foreign body in ear, nose and throat	9.5	0.7	Ear and nose injuries	18.2	0.7			
		Epistaxis	9.5	0.3	Epistaxis	18.2	0.3			
Infectious diseases		Bacillary dysentery and other infectious diarrhoea	33.3	1.9	Bacillary dysentery and other infectious diarrhoea	25.0	1.9	Bacillary dysentery and other infectious diarrhoea	–	1.9
		Virus hepatitis	33.3	0.7	Virus hepatitis	25.0	0.7	Virus hepatitis	–	0.7
		Tuberculosis	33.3	0.5	Tuberculosis	25.0	0.5	Pulmonary tuberculosis	–	0.5
		Other common infectious diseases (includes epidemic cerebrospinal meningitis, epidemic haemorrhagic fever, cholera, AIDS, common parasitic diseases, leprosy)	–	0.4	Other common infectious diseases (includes epidemic cerebrospinal meningitis, epidemic haemorrhagic fever, cholera, AIDS, common parasitic diseases, leprosy)	–	0.4	Other common infectious diseases (includes epidemic cerebrospinal meningitis, epidemic haemorrhagic fever, cholera, AIDS, common parasitic diseases, leprosy)	–	0.4
					Hand foot mouth disease	25.0	0.3	Hand foot mouth disease	–	0.3
Paediatrics	Diseases originating in the perinatal period	Jaundice of the newborn	13.3	77.2	Jaundice of the newborn	16.7	77.2	Jaundice of the newborn	–	77.2
		Abdominal pain in children	–	7.0	Abdominal pain in children	100.0	7.0	Anaemia in children	–	1.5
		Infant tetany of hands and feet	13.3	1.8	Infant tetany of hands and feet	–	1.8	Infantile diarrhoea	–	0.3
		Anaemia in children	13.3	1.5	Anaemia in children	16.7	1.5	Neonatal development	–	¶
		Neonatal haemorrhage	–	0.7	Neonatal pneumonia	16.7	0.5			
		Neonatal pneumonia	13.3	0.5	Infantile diarrhoea	16.7	0.3			
		Infantile diarrhoea	33.3	0.3						
		Neonatal asphyxia	13.3	0.0						

Continued

Table 2 Continued

		RTGP			RTAGP			TSGP		
Department*	Disease grouping	Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Disease	Proportion of training time (%)†	Proportion of visits (%)‡	Diseases	Proportion of training time (%)†	Proportion of visits (%)‡
		Neonatal sepsis	–	0.0						
	Neurological diseases	Childhood epilepsy, convulsions	–	4.9	Infantile convulsion	33.3	0.0	Infantile convulsion	–	0.0
	Endocrine, nutritional and metabolic diseases	Vitamin D deficiency	28.6	73.0	Vitamin D deficiency	100.0	73.0	Vitamin D deficiency	–	73.0
		Paediatric diabetes	14.3	1.0				Simple obesity	–	0.2
		Simple obesity	28.6	0.2				Malnutrition	–	0.1
		Malnutrition	28.6	0.1						
	Respiratory diseases	Respiratory diseases (includes upper respiratory tract infections, asthma, laryngitis, pneumonia)	100.0	61.3	Respiratory diseases (includes upper sensation, bronchitis, pneumonia, laryngitis)	100.0	61.3	Upper respiratory tract infection	–	48.6
								Asthma	–	1.4
								Pneumonia	–	1.3
	Congenital malformations	Congenital heart disease	–	4.2	Congenital heart disease	100.0	4.2			
	Infectious diseases	Common acute infectious diseases in children (includes poliomyelitis, measles, varicella, rubella, mumps)	100.0	1.8	Common acute infectious diseases in children (hand, foot and mouth disease, measles, varicella, mumps, scarlet fever, poliomyelitis)	–	1.8			
	Cardiovascular diseases	Viral myocarditis	–	0.4						
	Diseases of urogenital system	Acute nephritis and nephrotic syndrome	100.0	2.0				Acute glomerulonephritis	–	2.0
								Nephrotic syndrome	–	2.0
	Tumours	Acute leukaemia in children	100.0	4.5						
Geriatrics		Geriatric diseases (includes osteoporosis, falls, prostatic hyperplasia, dementia, urinary incontinence, constipation)	100.0	1.9						

Continued

Table 2 Continued

Department*	Disease grouping	Disease	RTGP Proportion of training time (%)†	RTGP Proportion of visits (%)‡	Disease	RTAGP Proportion of training time (%)†	RTAGP Proportion of visits (%)‡	Diseases	TSGP Proportion of training time (%)†	TSGP Proportion of visits (%)‡
Oncology			100.0	0.0						

Acute medical problems (such as myocardial infarction and acute asthma) were required in training in order to improve education of GPs regarding referral for these problems, but not with the aim of preparing GPs to provide treatment for these conditions.
*Department refers to the specialised department of tertiary hospitals where GP rotations took place.
†Proportion of training programme time required in tertiary hospitals.
‡Actual proportion of visits for diseases based on CHC data.
§No specific requirement in training programme.
¶Visit proportion not available.
CHC, community healthcare centre; GPs, general practitioners; RTAGP, Residents Training for Assistant General Practitioners; RTGP, Residents Training for General Practitioners; TSGP, Training for Specialists with General Practice interests.

not covered by any of the training programmes. There were relatively few visits for digestive diseases, except for cholecystitis, cholelithiasis and anorectal diseases.

In obstetrics and gynaecology, training in the RTGP programme was focussed solely on menopausal health and family planning, and there was no training time dedicated to diseases of the cervix, vaginal inflammation, abnormal vaginal bleeding, uterine fibroids or ovarian cysts. However, common diseases such as cervical disorders and vaginal inflammation (5.0% of outpatient visits) were included into the RTAGP training programme (28.6% of training time).

Several skin diseases received substantial time in the training programmes but had relatively few outpatient visits. These conditions included hives (15.2% of training time and 1.8% of outpatient visits) and acne (9.1% of training time and 0.3% of outpatient visits) in the RTGP programme. Among eye diseases, meibomian adenitis and meibomian cysts as well as glaucoma accounted for a small percentage of visits (0.8% for meibomian adenitis and meibomian cysts and 0.854% for glaucoma) but received substantial training time (meibomian adenitis and meibomian cysts: 31.6% in RTGP and 30.0% in RTAGP; glaucoma: 15.8% in RTGP and 15.0% in RTAGP).

In paediatrics, neonatal jaundice accounted for a relatively high proportion of actual visits (77.2%) and also received substantial attention in the RTGP and RTAGP training programmes (13.3% and 16.7% of training time in paediatrics, respectively). The actual visits for other diseases such as neonatal asphyxia, neonatal pneumonia and neonatal septicaemia were extremely low, and the training time devoted to these conditions was also low, ranging from 0.0% to 5.4% in the RTGP programme and from 0.0% to 1.8% in the RTAGP programme. Among paediatric endocrine, nutritional and metabolic diseases, actual visits for the diseases focussed on in training, such as vitamin D deficiency, reached 73.0%. Although other diseases have become the focus of RTGP programmes, the actual visit proportion for malnutrition, simple obesity and paediatric diabetes were extremely low (0.2% and 1.0%), compared with training time of 28.6% and 14.3%, respectively. In addition, visit proportions for paediatric urogenital diseases, congenital malformations, cardiovascular diseases, tumours and infectious diseases were much lower than in the training programmes.

Qualitative evaluation of the content and implementation of admission training programme

The qualitative interviews were conducted with in-service GPs who had gone through different training programmes. Interviewees came from six community health centres (marked as A through F, three urban and three suburban centres). Female constituted 54.2% of the interviewees. Most were in the 25 to 34 age group (45.8%), had an intermediate job classification (41.7%) and were practicing in urban areas (62.5%). Among the interviewees, 12 (50.0%) had participated in the RTGP programme, 7 (29.2%) in RTAGP and 7 (20.8%) in TSGP.

Qualitative evaluation of the content of admission training programmes

Interviewees reported that teaching mechanisms in the training programmes were not well-matched to the needs of trainees. The majority of GPs reported that their teachers were qualified as specialists. The standardised GP training in the general practice department takes about 6 months in some high-quality hospitals. However, most tertiary hospitals do not have general practice departments or have established them only recently. In addition, a substantial number of GPs are working in departments of traditional Chinese medicine in community healthcare institutions. However, there are no special modules for training in traditional Chinese medicine in the training programmes.

Evaluation of the education process in admission training programmes

A problem identified by GPs is that knowledge regarding referrals is rarely taught (16 participants). For example, the supply of prescription drugs available to outpatient clinicians for the treatment of respiratory diseases such as chronic obstructive pulmonary diseases is limited, and when such medications are needed, patients should be referred to specialists who are able to prescribe them. Additionally, GPs felt that communication skills regarding disease management were not well taught. As one participant reported, 'Communication skills taught were centred on treatment of disease rather than prevention and continuous management' (D5).

Evaluation of results of admission training programmes

Interviewees reported that treatments and medications covered by specialised department training programmes often do not meet the actual needs of the community. For instance, one interviewee reported that 'there are many patients with diabetes mellitus combined with coronary heart disease. However, for diabetes, there are fewer kinds of medications available in community health institutions than in tertiary hospitals, so we don't want to develop a complicated hypoglycaemic scheme like they can. A simple and convenient scheme is preferable' (D1). Among neurological diseases, epilepsy and Parkinson's disease occurred frequently. However, systematic training for these diseases was dependent on the capabilities of the neurology department of the training hospitals (F2). In addition, the interviewees pointed out that the coexistence of multiple diseases is quite common, 'but how to treat and manage these patients has not been carefully discussed' (F2).

DISCUSSION

Our analyses revealed that the clinical portions of admission GP training programmes in Shanghai were primarily modelled on the structure of the national training programme, indicating that GPs' clinical skills does not adequately consider evidence at the local level. China has a large and multi-ethnic population, with substantial differences between ethnic groups in terms of pathogenic factors and population health profile.[18] The design of admission training programmes for GPs should integrate the local spectrum of disease as well as the values and health beliefs of local populations. Furthermore, the standard training programme, RTGP, has not been updated since 2010 and has become disconnected from the changing health profile of the population.

Across many clinical areas, diseases that occurred frequently in Shanghai between 2014 and 2018 were not given substantial attention in the clinical competence training of GPs or were not included at all in training programmes. For example, in the area of cardiovascular diseases, there were relatively few outpatient visits for arrhythmias, while arrhythmia was included as a compulsory disease for study. At the same time, frequently-occurring diseases such as cerebrovascular disease, sequelae of cerebrovascular disease and cerebral infarction were not included in the admission training programmes. In contrast, the Accreditation Council for Graduate Medical Education (ACGME) in the USA sets the contents of training programmes for family doctors in the area of obstetrics and gynaecology based on routine gynaecological diseases seen in gynaecology departments.[19 20]

In the area of paediatrics, actual visits tended to focus on preventive care, and the proportion of the visits was quite low. Paediatrics departments in most community health centres in Shanghai handle only physical examinations and immunisation of children. Nonetheless, GPs are trained to handle a wide range of childhood diseases. In many other countries, community healthcare institutions provide comprehensive paediatric care. For example, community hospitals in the USA are required to provide medical services equating to at least 200 hours or 2 months, or to treat at least 250 patients, including at least 75 inpatients and 75 emergency patients.[21] Community healthcare institutions in the USA also have professional subdisciplines, such as paediatrics and gynaecology,[22] which help strengthen GP training in speciality areas. Unfortunately, community healthcare institutions in China are relatively weak in comparison.

Findings from our study suggest that training of GPs in China is currently more relevant to specialised clinical medicine than to primary care, and that admission training is limited by the abilities of specialised tertiary hospitals. Existing clinical training for GPs in Shanghai is mainly carried out in qualified tertiary hospitals, and the quality of different departments limits the consistency of training. The ability to provide appropriate training depends in part on the patient case mix seen in different departments of the hospital.[23] For example, while dermatological diseases are common in many Chinese communities, the number of patients seen in standard training depends on the actual number of patients with these conditions who are seen in the dermatology department of the hospital. Many standardised training hospitals do

not have psychiatry departments, and psychiatry training is arranged in the neurology or psychology department, which can result in insufficient or substandard psychiatry training for GPs.

In contrast to the system in China, other industrialised countries have more effective and comprehensive planning around training for GPs, involving strict and regular reviews on training and development of the GP workforce.[24] For example, in 2001, the federal government of Australia established the General Practice Education and Training Limited (GPET), a third-party organisation, to take over GP training, which had previously been managed by the General Practice Medical Association. The GPET purchases general practice training services in various regions by means of bidding.[24] The Chinese National Health Bureau can learn from the experiences of other developed countries to improve supervision and guidance for implementation of standardised training.[25]

Training programmes for GPs in China lack in-depth participation of general practice teaching teams. At present, few tertiary hospitals in Shanghai have professional GP specialised teaching teams.[26] Although the Chinese government has begun to establish general practice departments in more tertiary hospitals, establishment and qualification of training programmes in general practice departments will take time.[27] Improving teaching has been identified as one of the key factors for improving the quality of GPs.[28] According to the World Organization of National Colleges, Academies and Academic Association of General Practitioners (WONCA), half of the training time should be spent in a general practice environment, with GPs acting as the principal teachers and mentors.[29]

Finally, current GP training in China does not adequately prepare trainees in the areas of differential diagnosis and criteria for referring patients with frequently-occurring diseases. In addition, GP training does not adequately address communication with patients. As GPs play a dual role as clinicians and public health practitioners, they require sufficient communication skills to build relationships with their patients. In Australia, the curriculum of the Royal Australian College of General Practitioners includes population health and the context of practice as one of its five domains. Core skills covered in this area include the incorporation of a population health perspective into clinical practice, and leadership and advocacy in addressing the health needs of the community effectively and equitably.[30] However, this training consistently lags behind other aspects of clinical training.[30]

This study attempted to identify problems with the current GP admission training system in China. Although visit proportions for different diseases may differ between Shanghai and other parts of China, the GP training programmes are similar in other regions. Therefore, we estimate that GP training is not sufficiently evidence-based in terms of the overall public health needs of China. We calculated the proportion of teaching coverage for different diseases based on published standardised training programme manuals. However, actual teaching patterns may vary and may in fact take into account the case mix of patients seen at different hospitals. We recommend that future studies explore implementation of GP training curricula in the context of different patient populations. Finally, our qualitative evaluation did not assess the three different GP training programmes separately. However, all of the interviews were conducted in Shanghai and thus represent a broad view of GP training in China.

CONCLUSION

In summary, the establishment and implementation of admission training programmes for GPs in China lacks adequate emphasis on general practice training. To improve GP admission training in China, we urge that GP training curricula be re-examined in order to bring the teaching system for GPs in line with the medical needs of the populations they will serve. Findings from this study can inform improvements to the structure and content of GP training programmes in China, as well as provide guidance for other developing countries facing challenges in the wake of healthcare reforms.

Author affiliations
[1]School of Public Health, Shanghai Jiao Tong University School of Medicine, Shanghai, China
[2]Department of General Practice, Tongji University Affilliated Yangpu Hospital, Shanghai, Shanghai, China
[3]General Practice Center, Nanhai Hospital, Southern Medical University, Foshan, China
[4]Shanghai Dongfang Hospital, School of Medicine, Tongji University, Shanghai, China
[5]General Practice Department, Peking University First Hospital, Beijing, China
[6]Shanghai Tenth People's Hospital, Tongji University School of Medicine, Shanghai, China
[7]Pengpuxincun Community Health Service Center, Shanghai, China
[8]School of Public Health, Fudan University, Shanghai, China
[9]General Practice Department, Yangpu Hospital, Tongji University School of Medicine, Shanghai, China
[10]School of Economics & Management, Tongji University, Shanghai, China
[11]School of Medicine, Tongji University, Shanghai, China

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Contributors JS and ZW conceived and designed the study. QD, XG, JH, YY, NC and QL analysed the data. CC, WY, RL, CC, LL, DY, and HJ contributed reagents/materials/analysis tools. JS and ZW wrote the paper. QD revised the paper.

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ORCID iDs
Jianwei Shi http://orcid.org/0000-0002-3523-6246
Jiaoling Huang http://orcid.org/0000-0003-1975-3937
Zhaoxin Wang http://orcid.org/0000-0002-5022-4497

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