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An Overview of Continuing Medical Education/Continuing Professional Development Systems in China: A Mixed Methods Assessment

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ABSTRACT

Aims of this assessment were to describe requirements for physicians to engage in CME/CPD; explore perceptions of In-Country SMEs of their CME/CPD systems; describe perceptions of In-Country physicians about interprofessional continuing education (IPCE) and independent CME/CPD; and provide recommendations that may be adopted to improve quality and effectiveness. This assessment used a mixed-methods approach that included 1:1 interviews with in-country subject matter experts and an electronic survey capturing qualitative and quantitative data from practicing in-country physicians. This assessment reflects a country invested in the education of its physician workforce. CME/CPD systems have embedded governance structures, organizations authorized to provide education, and a recognized credit system. Governing bodies have implemented regulations to limit influence from commercial interest organizations on CME/CPD, and there is opportunity to expand delivery systems to reach physicians across diverse geographic regions, better align content to individual physicians' gaps and learning needs, and reduce cost. There is opportunity to invest in IPCE within a country with a strong professional hierarchy system. This assessment reflects CME/CPD systems that are relatively mature and identifies several opportunities to expand and enhance systems to better meet educational needs of physicians and to positively impact practice and patient outcomes.

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Introduction

Globally, health care professionals (HCPs) engage in continuing medical education (CME)/continuing professional development (CPD) to ensure they remain competent to deliver high-quality, evidence-based care that supports positive patient and population health outcomes. The systems that support HCPs to regularly and actively participate in CME/CPD vary widely however, and it is critical that stakeholders, including those participating in and financing those systems, understand the elements that best support their desired outcomes.



This manuscript describes the current state of the CME/CPD systems in seven provinces and municipalities in China as described by In-Country subject matter experts (SMEs) as well as input collected from In-Country physician practitioners throughout China via an electronic survey. This assessment includes the capital cities/provinces and municipalities of Beijing (municipality), Changsha (province – Hunan), Chengdu (province – Sichuan), Guangdong (province), Hangzhou (province – Zhejiang), Shanghai (municipality), and Xi'an (province –

Shaanxi) from the perspective of In-Country SMEs and across China more broadly from in-country physicians.

This manuscript is one in a series of four assessments that describe CME/CPD systems in different regions of the world (China, Europe, Latin America, and the Middle East/North Africa). This manuscript also supplements a summative, comparative manuscript of the four different regions, and complements two previously published manuscripts using the same mixed methods methodology describing CME/CPD systems in Japan and seven countries in the Asia-Pacific region.

Overview

China is the world's most populous country with a population of almost 1.5 billion people. Standard Chinese (Mandarin) is the official language spoken in China and was the language that was used to administer the survey in this assessment. English is considered the most critical foreign language, and most English speakers are located in the urban centres of the

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country. As of 2019, there were 2.2 physicians per 1000 people in China [1].

Medical Education Systems in China

Academic preparation for physicians in China is standardised. There are two paths of academic preparation for physicians and both paths begin immediately following completion of secondary school. The first path requires 8 years to complete and includes conferral of a baccalaureate degree, medical degree, and a PhD. Within the first path, students may take the national licencing exam for physicians following successful conclusion of the 5th year and prior to continuing to their doctoral programme. The second path requires 5 years to complete and confers a baccalaureate degree plus fellowship and training to attain a medical degree. Medical school tuition is modest and is heavily subsidised by the central/local government. Graduates have the opportunity to specialise through residency or fellowship training. The practice of medicine in China is governed by a national, provincial or municipal regulatory body. Graduates must pass a national licencing exam and a clinical skills exam to be permitted to practice medicine.

CME/CPD Requirements for Physicians (See Appendix)

The CME/CPD requirements for physicians across China vary more widely as compared to the medical education and training systems. Participation is mandatory and tied to licensure in some regions while not required in others. In regions where participation is not required, employers may choose to require participation and/or participation may be required for additional privileges such as promotion. In the provinces and municipalities that were represented by SMEs in this review, 4 of 7 mandated participation, 2 had local mandates, and 1 had no mandatory requirement.

In regions where participation is required, physicians are expected to complete a total of 25–30 CME/CPD credits annually. In some regions, the credit system is categorised into a two-tiered system (Type 1 and Type 2). Type 1 credits are considered to be of higher quality and more organised, and they are independently evaluated and approved. Type 2 credits, in contrast, are more self-directed and include such activities as self-study, publishing, and completing research projects. Physicians need fewer Type 1 credits (5–10 annually based on regulatory requirements) than Type 2 credits (15–20 annually). The credit systems are based on pre-determined matrices by the responsible authority and may be calculated by time (e.g.

1 hour of engagement = 0.5 credits) or other method of determining the appropriate credit to award.

In China, the implementation of relevant laws and regulations allowing healthcare professionals to receive “self-directed learning” as verifiable credits primarily follows a series of documents and guiding principles issued by the National Health Commission (formerly the Ministry of Health) and related departments. These documents usually detail the requirements for CME, the credit system, and the status and role of self-directed learning within it. First, the implementation of healthcare professionals’ participation in self-directed learning and obtaining credits typically relies on recognition and management by their respective medical institutions or relevant academic organisations. These institutions or organisations develop corresponding CME/CPD plans and credit management systems in accordance with the guidance documents from the National Health Commission. Second, the content and format of self-directed learning usually need to meet certain standards and requirements. For example, the content of learning should be closely related to the healthcare professionals’ speciality and career development, and the format may include online courses, reading of academic literature, participating in professional discussions, etc. Healthcare professionals are required to complete self-directed learning and retain relevant proof materials according to prescribed procedures and requirements. Then, medical institutions or academic organisations regularly review and certify the CME/CPD credits obtained by healthcare professionals. During the review process, healthcare professionals need to submit proof materials of self-directed learning, such as certificates and learning reports. These materials are used to verify the healthcare professionals’ credit acquisition status. Furthermore, to ensure the quality and effectiveness of self-learning, some medical institutions or academic organisations also supervise and guide healthcare professionals’ self-learning processes. This may include organising regular academic exchange activities, providing learning resources and support, or similar. It is worth noting that the specific implementation details may vary depending on the region, medical institution, and academic organisation. Therefore, healthcare professionals should pay attention to the specific policies and requirements of their regions and institutions in practical operations to ensure that the credits obtained from self-directed learning are recognised and verified. Overall, the implementation of laws and regulations allowing healthcare professionals to receive “self-directed learning” as verifiable credits in our country is a comprehensive process involving multiple stages

and aspects. It requires joint efforts and cooperation among medical institutions, academic organisations, healthcare professionals, and relevant policy makers to ensure the quality and effectiveness of CME/CPD.

CME/CPD Provider System

The CME/CPD provider systems, defined as organisations that develop CME/CPD educational activities, are primarily regulated by a governmental agency in the province and/or a medical association, often through a CME committee or health commission/ministry. Hospitals also take a primary role in establishing and monitoring participation for their own physicians.

Types of organisations that can provide CME/CPD include medical associations, hospitals and health departments, colleges and universities, and approved training organisations. Pharmaceutical companies may not provide CME/CPD directly to physicians but are permitted to provide financial support to the CME/CPD provider for the educational activity itself, for physicians to travel to an educational activity, or to pay a physician's expenses to attend such as the registration fee.

Physicians in China have an opportunity to participate in CME/CPD in multiple types of formats that may include but are not limited to live and web-based educational programmes, conferences and scientific meetings, simulation, skills or practice-based education, and scholarly publications. Physicians can also receive credit for self-directed learning activities.

Review of the Literature on CME/CPD in China

A focused review of the literature on CME/CPD in China was conducted using electronic databases (MEDLINE, PubMed, and CINAHL), with limitations of available in the English language in full text, research studies, and published in a peer-reviewed journal within the past 10 years. A total of 7 articles were identified as meeting inclusion criteria and a brief summary of the articles is provided below.

Engagement in Continuing Professional Development

Two studies explored physician engagement in continuing professional development. Zhu et al. [2] conducted an exploratory, qualitative study of the needs, opportunities, and challenges of Chinese physicians (all but 1 who were trained as specialist physicians) to function as competent general practitioners through engagement in CPD with a focus on the use of

augmented reality. The researchers interviewed 13 physicians and 2 managers in primary care practice settings in Wuhan, China, using semi-structured, face-to-face interviews. Thematic results from the study that reflected engagement in CPD and CPD models included: some available opportunities to engage in GP training activities however CME/CPD was primarily provided in lecture format only, focused primarily on theoretical concepts, and lacked or had limited opportunity to apply newly learned skills in a practice setting; limited support for engaging in CME/CPD if the physician was recently employed or was needed for staffing purposes; and a receptivity for technology solutions that might support more flexible and accessible engagement in CME/CPD [2]. The second study explored facilitators and barriers of physician engagement in CPD using an explanatory, sequential research design [3]. The mixed methods design used a 2-phase approach and included a quantitative survey administered to physicians practicing in Hong Kong followed by individual semi-structured telephone interviews of a random sample of respondents who completed the quantitative survey. Results of the study demonstrated that physicians strongly supported engaging in CME/CPD to maintain competence, however just over 50% believed that participation should be a requirement to practice medicine. Non-specialist physicians and younger physicians were significantly less likely to support mandatory engagement as compared to their specialist physician and older colleagues. In this study, 78.6% of respondents reported having no or few barriers to engaging in CME/CPD, while 16.7% reported a significant or great deal of barriers. Non-specialist physicians were more likely to report experiencing barriers as compared to their specialist colleagues. The most common barriers reported included lack of time, negative impact on work-life balance, inconvenient time/place, cost, and unavailability of suitable activities. Facilitators to engagement were reported as flexible times and locations, more relevant content, lower CE point requirements for non-specialist physicians, and online delivery platforms. Other suggested facilitating factors included providing cash allowances or tax reductions to support engagement [3].

Innovative Delivery Models to Engage Rural Physicians in CME/CPD

To address the challenges faced by rural physicians in general practice in China, researchers developed an innovative, staged delivery model of CME to improve the clinical skills of rural doctors and to evaluate the effectiveness of the staged model for scaling to other

regions of the country [4]. The model was titled the “Spring Seedling Project-Zhaotong Program” and included a rural doctor training module for country doctors of village clinics. The study design was a single group, pre/post intervention design employing both quantitative and qualitative methods. The rural setting was located in Zhaotong, in the northeastern section of the Yunnan Province. A total of 1866 country doctors from 1302 village clinics enrolled in the study. Funding was provided by the Shanghai Charity Foundation. The programme was conducted in three stages: 100 hours of video education presented online conducted over 3 months (all 1866 participated and 96% completed this stage) followed by post-test; 5-day workshop conducted in Zhaotong City for select high-scoring participants from stage 1 ($N=201$); and 2-week practice-based training programme conducted in Shanghai City for select high-scoring participants from stage 2 ($N=31$). Results from the study demonstrated high engagement of physicians in stage 1; statistically significant increases in knowledge and skills at each stage of the programme; increase in physician competence after field training (stage 3); and the generation of “seeds” (physicians with improved skills) that could return to their rural practice settings and continue to mentor others. The programme was deemed successful partly by addressing barriers that might have prevented physician engagement in CME/CPD, including relevant content for physicians in this practice setting, online delivery of content, and external funding [4].

Training Needs and Curriculum in CME in Tibet, China

The educational needs of physicians in general practice in Tibet were explored through a cross-sectional survey administered online [5]. The focus of this assessment was to evaluate priorities in CME curriculum topic areas as perceived by respondents, the majority of whom were working in primary care settings. Results from the study demonstrated that the clinical topic areas of cardiovascular, respiratory, and digestive diseases were most relevant to these respondents. In addition, respondents reported a need to have content that was accessible on-demand and staged in order to better meet their learning needs [5].

Perceptions Regarding Industry Support of CME

Perceptions of industry supported CME among attendees of a neurology conference were evaluated through a cross-sectional survey design with aims of determining perceptions of industry-supported CME, examining

potential associations between perceptions and demographic variables, and comparing Chinese physician perceptions to those of US physicians [6]. Results revealed that most respondents preferred or had no preference regarding industry-supported CME; believed that industry support for CME was valuable; and believed that industry-supported CME was biased [6]. When Chinese physician perceptions of industry-supported CME were compared to US physician perceptions using a previously published study, Chinese physicians had more favourable views of industry-supported CME, however, were also more likely to believe that industry-supported CME was biased.

Job Satisfaction and Relationship with Continuing Education

In a national study evaluating the relationship between job satisfaction and associated factors among medical staff in tertiary public hospitals in China, researchers reported that educational background of respondents (including physicians and nurses) had a positive association with job satisfaction [7]. The researchers hypothesised that providing degree-awarding continuing education could increase the job satisfaction of physicians and nurses by providing more opportunities to participate in academic activities, obtain research grants, and be eligible for promotions.

Lifelong Learning Scores of Chinese Rural Physicians

The Chinese National Educational Plan for Rural Physicians (2011–2020) identified the need to cultivate lifelong learning of rural physicians as a strategy to improve the quality of primary health care in rural areas [8]. Researchers in this study examined the reliability and validity of an instrument with good psychometric properties that has been used to assess physicians’ orientation to lifelong learning in other settings (Jefferson Scale of Physicians Lifelong Learning) to measure perceptions of lifelong learning in Chinese rural physicians. Results of the study demonstrated satisfactory reliability scores (overall Cronbach’s α coefficient of 0.872) for the instrument which had been translated and back translated by bilingual researchers from 2 local universities. In addition, the researchers found that rural physicians who participated in at least 15 days of continuing medical education annually had significantly higher lifelong learning scores as compared to those who did not ($p < 0.01$); and lifelong learning scores negatively correlated with years of experience up to 30 years of

experience after which scores increased. Higher lifelong learning scores were associated with improved competence, quality of care, and career satisfaction [8].

In summary, this focused review of the literature demonstrates strong interest by some physicians to engage in CME/CPD, mixed perceptions of mandating participation, identification of barriers to participation in CME/CPD, and investment in pilots by the Chinese government to reach rural physicians in the country. Significant national attention is focused on increasing the knowledge, skills and abilities of rural physicians.

Mixed-Methods Assessment Strategy

To evaluate each province and municipality with greater depth and to assess the overall perception of the CME/CPD systems in China from a broad group of physicians, a mixed-methods assessment strategy was employed in a 3-pronged approach that included 1:1 interviews with In-Country SMEs facilitated by two Regional SMEs, and an electronic survey to capture both quantitative and qualitative data from in-country physicians. The Regional SMEs, Drs. Kuang and Yang, were academic and clinical experts with a close affiliation with the Association for Medical Education in Europe (AMEE) and who regularly contribute through annual participation and presentations, and through AMEE committees. The Dr Yang is Associate Professor in Medicine, Deputy Director, Faculty Development Center for Health Professions Education, First Affiliated Hospital of Sun Yat-sen University, Co-Director, AMEE International Networking Center in China, Associate Fellow of AMEE, Sino-Russian New Educator of the Year Award in 2021. Dr Kuang is Professor in Surgery, Vice-President, First Affiliated Hospital of Sun Yat-sen University. Dean, Zhong Shan School of Medicine, Sun Yat-sen University, Chancellor's Assistant, Sun Yat-sen University, and was named Honorary Fellow of AMEE in 2022. He was a founding member of the CPD Committee at AMEE and was responsible for helping to set the standards for the Committee. He serves as his hospital's representative and a founding member of the China Consortium of Elite Teaching Hospitals.

The survey that was used to capture data from in-country physicians was used in previous assessments; therefore, the results of this assessment provide an opportunity to compare results globally. The survey captured demographic data from in-country physicians as well as self-report data from in-country physicians that reflected characteristics of the CME/CPD system in their respective places of employment, perceptions

of industry-supported CME/CPD, and perceptions of how well the current CME/CPD systems were meeting physicians' educational needs. This assessment was led by an independent HPE with experience in global CPD and IPCE and two Regional SMEs from China. The study was reviewed and approved by the IRB at the First Affiliated Hospital of Sun Yat-sen University, where the AMEE International Networking Center is housed (No. 2021[138]).

In this assessment, CME and CPD were defined as:

- Continuing Medical Education (CME) educational activities which serve to maintain, develop, or increase the knowledge, skills, and professional performance and relationships that a physician uses to provide services for patients, the public, or the profession [9].
- Continuing Professional Development (CPD) involves not only educational activities to enhance medical competence in medical knowledge and skills, but also in management, team building, professionalism, interpersonal communication, technology, teaching, and accountability [10].

In this assessment, interprofessional continuing education (IPCE) was defined as:

- Interprofessional Continuing Education (IPCE) when members from two or more professions learn with, from, and about each other to enable effective collaboration and improve health outcomes. IPCE relates to practicing health care professional team-based education. In comparison, interprofessional education (IPE) relates to health care students (undergraduate) [11].

In this assessment, independent CME/CPD was defined as:

- CME/CPD for which financial, or in-kind, contributions given by a commercial interest, which is used to pay all or part of the costs of an activity. The definition of roles and requirements when commercial support is received are outlined in the ACCME Standards for Commercial Support and although this is a US-based organisation, it is accepted as the standard for defining roles and responsibilities. The commercial supporter cannot be involved in the planning, delivery, or evaluation of the educational activities and all decisions are made by the educational provider [12].

Each In-Country SME participated in a 1:1 focused interview with the HPE and Regional SME to provide an overview of his/her CME/CPD system. Interviews lasted between 30 and 60 min and were guided by the HPE using a standard set of questions. If translation was needed, the Regional SME provided the service. No compensation was provided to In-Country SMEs. Country-level data were summarised in table format and sent back to the In-Country SME for validation. In-Country SMEs confirmed the data and/or made changes to ensure the data were accurate.

The electronic survey that was used to capture quantitative and qualitative data from in-country physicians in China was translated into Mandarin by the Regional SME. Once translation was complete, the survey was disseminated electronically using WenJuanXing® by the In-Country SMEs. Purposive, heterogeneous sampling through dissemination of the survey by trusted organisations and In-Country SMEs was used to access respondents as the aim of this assessment was to capture the perceptions of physicians who represented diversity across specialities, practice settings, age, gender and experience. Respondents self-selected to participate and no incentives were provided.

The survey in China was administered for a total of 35 weeks and 2 days. When necessary, reminders were sent to maximise participation. The survey remained open for the extended period to allow partner organisations to disseminate and to maximise the number of respondents.

Following the survey close, data were downloaded from WenJuanXing® and free text items were translated from Mandarin into English by the Regional SME. The data file was then sent electronically to a doctorally prepared researcher for further analysis.

The original data file included 2952 rows of respondent data including quantitative data, original free text responses in Mandarin, and translated responses in English. All personal identifiers, including IP addresses, were immediately removed from the data file, and analysis was performed using only the deidentified file. A case number was created for each respondent row to track and ensure accuracy during the analysis process.

One respondent practiced outside China and that case was removed from the data set. After consultation with the In-Country SME, there were 10 respondents who reported seeing patients at a rate that was determined to be outside a reasonable workload. Therefore, the number of patients seen per day as

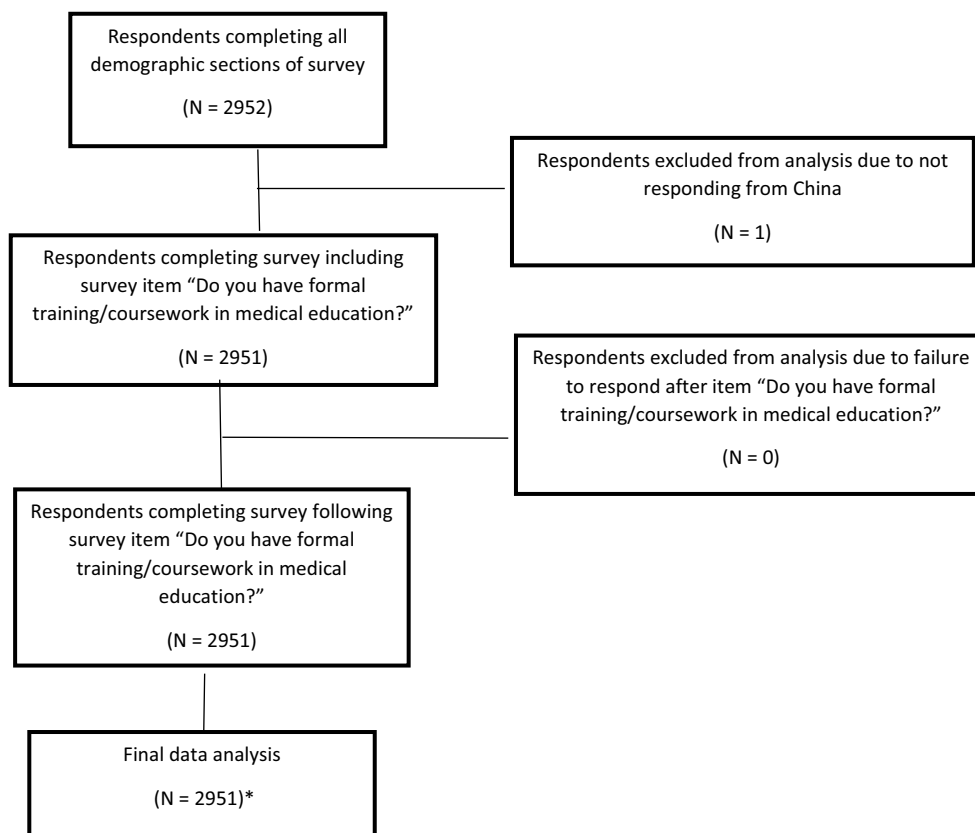


Figure 1. Data cleaning for analysis.

*Note: Respondent drop off over survey noted in tables as missing data.

reported by the respondent was removed from that variable only [3–400 patients (3 cases); 500 patients (3 cases); 1000 patients (3 cases); and 6000 patients (1 case)]. There were 281 respondents who reported seeing no patients per day and these were removed from the data set for that variable only before calculating the average number of patients seen per day. The purpose of removing the 281 respondents who reported seeing no patients per day was to reflect the average number of patients seen per day for those in clinical practice. Otherwise, all 2951 respondents who started the survey completed each item (see Figure 1).

Quantitative analyses were conducted using IBM SPSS Statistical software Version 28 and included descriptive statistics (mean, standard deviation, %). Thematic analysis was conducted on the qualitative data collected via the survey (e.g. open response questions) by the doctorally prepared researcher, who aggregated and summarised comments by overall theme as they related to the survey item.

Table 1. Demographic characteristics of respondents.

	China
Number of respondents included in analysis (N)	2951
Specialty area of practice (%)	
General Practice	15.5%
Internal Medicine	9.3%
Internal Medicine Subspecialty	13.2%
Pediatrics	6.7%
Surgery	5.0%
Surgery Specialty	9.0%
Obstetrics/Gynecology	6.3%
Psychiatry	1.6%
Other	33.3%
Place of employment (%)	
University Hospitals	28.7%
Teaching Hospital	7.2%
Other Public Hospital	37.2%
Private Hospital	7.4%
Community Hospital	10.5%
Medical College (as Teaching Faculty)	0.8%
Other (non-specified)	5.6%
I do not do clinical work.	2.6%
Years since graduation (%)	
<6	22.1%
6–10	19.0%
11–15	21.2%
16–20	14.4%
21–25	11.0%
>25	12.3%
Average number of patients seen per day (mean/SD)	N = 2660 28.07 (28)
Responsibility for educating others	
Medical Students	43.4%
Postgraduate	14.0%
Resident Doctors	38.1%
Specialists	19.9%
Other	35.8%
Formal training or coursework in medical education	
Yes	50.6%
No	49.4%

Results

Physicians from 32 individual province or municipalities across China responded to the electronic survey. The following is an aggregate summary of the quantitative and qualitative data. Qualitative data provided by In-Country SMEs via focused interviews that reflect the province and municipality perspectives are also presented in summary.

Quantitative Survey Data

Demographics (Table 1)

A total of 2951 physicians from China were included in this analysis with the largest volume of respondents from Guangdong ($N=572$; 19.4%), Hebei ($N=436$; 14.8%), and Beijing ($N=370$; 12.5%), though the distribution of respondents reflected diversity across the country with 32 different provinces or municipalities represented. More respondents practiced in general practice than in any other single speciality or subspeciality. More than 20% of respondents practiced in internal medicine or an internal medicine subspeciality, while 14% practiced in surgery or a surgical subspeciality. Approximately one-third of respondents reported an area of practice as “other”. “Other included physicians from other specialities who participated in the survey, including dentistry, ophthalmology, ENT, traditional Chinese medicine, rehab medicine, educational management, among others. More respondents practiced in public hospitals and in Direct University Affiliated Hospitals than in any other type of practice setting.

Most respondents practised in large cities and graduated less than 15 years ago from medical school. Most respondents practiced clinically and reported seeing patients. The average number of patients seen per day for those in clinical practice averaged 28.07 (SD 28.02).

Most respondents reported being responsible for medical students and resident doctors. There were more respondents who reported no responsibility for any category of learners than those who were responsible for teaching. Just over 50% of respondents reported having formal training or coursework in medical education; formal training or coursework was not defined and respondents made their own determination in whether their experience was relevant.

Perceptions of the Current in-Country CME/CPD System (Table 2)

Almost 50% of respondents were not aware of the CME/CPD system in their country despite many

Table 2. Perspectives of In-Country physicians: Awareness and participation.

	China
Number of respondents included in analysis (N)	2951
Aware of CME/CPD system in country (%)	
Yes	31.2%
No	19.0%
Not sure	49.8%
Hours of CME/CPD in past year	
0	26.0%
1–10	N.D.
11–20	36.5%
21–30	13.9%
31–40	7.8%
41–50	9.7%
>50+	6.0%
CME/CPD available meets my needs	
Strongly agree	13.1%
Agree	68.4%
Disagree	16.8%
Strongly disagree	1.7%
Participation in CME/CPD should be compulsory	
Strongly agree	11.7%
Agree	45.9%
Disagree	38.7%
Strongly disagree	3.7%
Interprofessional CE is needed	
Yes	82.1%
No	6.5%
Not sure	11.4%

areas requiring participation to practice medicine. Most respondents reported participating in 11–20 h of CME/CPD activities in the previous 12 months. Most respondents strongly agreed or agreed that the CME/CPD available to them met their needs, and strongly agreed or agreed that participating in CME/CPD ensures they have current knowledge to care for their patients, increases competence and skills, and should be compulsory. Most respondents believe that interprofessional continuing education (IPCE) is needed in their countries, while just over half had participated in IPCE.

Table 3. Perceptions of In-Country physicians: Independence and commercial influence/Bias.

	China
Number of respondents included in analysis (N)	2951
CME/CPD in my country is free from control by pharmaceutical or other commercial interests	
Strongly agree	12.6%
Agree	63.1%
Disagree	22.5%
Strongly disagree	1.8%
I have participated in CME/CPD that has been developed by independent CME/CPD providers with financial support from pharmaceutical or other commercial interest organisations	
Yes	65.8%
No	34.2%
CME/CPD funded by pharmaceutical or other commercial interest organisations can be free from bias:	
Strongly agree	8.4%
Agree	50.2%
Disagree	39.5%
Strongly disagree	1.9%

Preference in Educational Format

When asked to rank educational format from 1 (low) to 5 (high), respondents selected 4 or 5 most often for online patient case-based learning programmes ($N = 2470$); hands-on learning ($N = 2463$); attending live regional educational activities ($N = 2172$); online video lecture ($N = 2150$); answering questions at the end of e-learning activities ($N = 2114$); and attending national and international conferences/symposia ($N = 2102$). Reading journal-based or other printed materials ($N = 1994$); serving as a supervisory physician ($N = 1751$); authoring medical papers and books ($N = 1625$); and listening to podcasts ($N = 1472$) were also selected but less frequently.

Perceptions of Industry-Supported CME/CPD (Table 3)

Most respondents strongly agreed or agreed that the CME/CPD in his/her country was free from any control by pharmaceutical or other commercial interest organisations and were aware that CME/CPD is commonly developed by independent providers with financial support from pharmaceutical or other commercial interest organisations. Almost two-thirds of respondents had participated in independent, commercially supported CME/CPD.

Participation in Pharma or Commercially Supported CME/CPD (Table 4)

Most respondents strongly agreed or agreed that content developed independently by a CME/CPD education company could be used towards their required educational hours (credits) and a large number of

Table 4. Participation in pharma or commercially supported CME/CPD.

	China
Number of respondents included in analysis (N)	2951
Independent CME/CPD Should Be Used Towards My Requirements	
Strongly agree	9.7%
Agree	62.1%
Disagree	26.8%
Strongly disagree	1.4%
If CME/CPD funded by Pharma or a Commercial Interest was available to you, how would you choose to participate:	
Based on my clinical speciality	72.0%
Based on the presenting faculty	40.6%
Only when at least one presenting faculty member is from my country	16.1%
The relevance of the education to my practice	68.9%
Curiosity for the topic (but not necessarily related to my practice)	57.7%
The city where the meeting is located	36.6%
I could not participate in independent CME/CPD funded by a pharmaceutical or other commercial interest organisation	4.5%
Other	1.2%

Table 5. Perspectives of In-Country physicians: What independence in CME/CPD means.

	China
Number of respondents included in analysis (N)	2951
CME/CPD that is developed by an independent CME provider with financial support from pharmaceutical or other commercial interest organisations means:	
Pharma or Commercial Interest must review and approve all content	37.2%
Pharma or Commercial Interest can suggest speakers	35.6%
Pharma or Commercial Interest works with the educational provider to develop content	54.1%
Pharma or Commercial Interest has no influence on content and speaker selection	44.3%
Content is developed independently by the education company to address the needs of learners	40.5%
I don't know	17.6%

respondents would choose to participate in independent CME/CPD if the content was based on his/her clinical speciality and/or the education was relevant to his/her practice. Most respondents strongly agreed or agreed that independent CME/CPD can be beneficial to provide current and clinically relevant information (84.8%) but were less sure that it could be free from bias (58.6%).

Perceptions of Independence in CME/CPD (Table 5)

Perceptions of CME/CPD developed by an independent provider with financial support from a pharmaceutical or other commercial interest organisation varied. A relatively large number of respondents believed that a pharmaceutical or commercial interest organisation can have influence into planning decisions in independent CME/CPD, including reviewing and approving all

Table 6. Perceptions of In-Country physicians: Missing from CME/CPD system and barriers to participation.

	China
Number of respondents included in analysis (N)	2951
What is Missing From the CME/CPD Currently Available to You?	
Ability to choose education that suits my specific needs	54.3%
Ability to keep up to date with the most current research	50.8%
Ability to network with colleagues	43.2%
Content that is current/up to date	40.5%
Variety of educational formats (ie. Live, online, web-based, experiential, preceptorships)	50.7%
Innovative learning environments and new creative formats	34.7%
More frequent and more diverse programmes	30.5%
Patient-focused programmes	31.3%
Not applicable enough	24.7%
Nothing is missing	4.7%
What Are Your Barriers to Participating in CME/CPD (if any)?	
Not covered in my budget	47.1%
Topics are not relevant/clinically important to me	43.0%
Quality is not high	25.6%
Learning objectives are not clear	21.3%
Not offered at convenient times	66.2%
Formats are not flexible enough	27.9%
Not enough skill building exercise	31.8%
I do not have any barriers	4.8%

content, suggesting speakers, and working with the educational provider to develop content.

Less than ½ of respondents reported that the pharmaceutical or commercial interest organisation can have no influence on content or speaker selection in independent CME/CPD and that content is independently developed by the education company to address the needs of learners. Almost 20% did not know what independent CME/CPD meant.

Missing from current CME/CPD system and barriers to participation (Table 6)

Respondents reported that the ability to choose education that addresses their individual needs, ability to keep up to date with the most current research, variety of educational formats, ability to network with colleagues, and content that is current/up to date were missing from their current CME/CPD systems. Other areas that were missing included innovative learning environments and new creative formats, patient-focused programmes, more frequent and diverse programmes, and CE that was not applicable enough. Barriers to participation in the current CME/CPD systems were primarily related to not being offered at a convenient time, not covered in my budget, topics are not relevant/clinically important to me, not enough skill-building exercise, and formats that are not flexible enough. Only 4.8% reported having no barriers.

Preparation as Life-Long Learner and Consultant

More than 60% of respondents reported that their undergraduate training prepared them to be life-long learners (64.7%) and reported that their post-graduate training prepared them to practice as a consultant (62.8%).

Qualitative Survey Data

Overall, qualitative data collected via the electronic survey substantiated the quantitative survey findings. Respondents reported a need for more CE to be available and at no cost to learners. They strongly recommended increasing diversity and flexibility in both content and modes of delivery. They reported needed relevant and practical content, particularly content that is more closely aligned with the practice setting including geographic region and hospital setting. A number of respondents suggested that the mandatory CME/CPD requirements be abolished.

Qualitative Data from the In-Country SME 1:1 Interviews

Discussion from the In-Country SME interviews added an additional dimension to the overall findings of this

assessment. Overall, In-Country SMEs described a strong focus and commitment to lifelong learning in urban settings and in academic health care organisations, with significant integration of CME into the workplace setting. In-Country SMEs reported that opportunities to engage in CME/CPD were generally readily available and scholarship output such as publications and research studies was high. The COVID-19 pandemic led to an increase in web-based, distance education that increased participation significantly. In comparison, In-Country SMEs reported that opportunities to engage in CME/CPD in more rural areas were of considerable challenge for physicians due in part to lack of time to engage in education due to very high workload; reluctance to leave the practice setting to engage in CME/CPD and lose income; and CME/CPD not being aligned with the educational needs of physicians.

There were a few areas of opportunity to improve the current CME/CPD systems as described by the In-Country SMEs. Most In-Country SMEs believed that there is an opportunity to better align the CME/CPD systems to address gaps in practice at the local or regional level. They also believed that the mandatory requirements for credit to maintain licensure resulted in some physicians pursuing education just to obtain the credit as opposed to education to increase skills and improve practice. They believed that cost to participate in CME/CPD is a barrier to engagement, whether the “cost” was related to actual expenses for the CME/CPD activity or was related to loss of income from the clinical practice setting.

There was little discussion about interprofessional continuing education (IPCE) in the current CME/CPD systems in China. Examples of IPCE were more prevalent in the hospital clinical setting such as teaching cardiopulmonary resuscitation (CPR) or advanced cardiac life support (ACLS) with multiple professions or teaching nurses how to use equipment in the operating room.

In-Country SMEs described that previously there were sporadic cases of CME/CPD activities supported by pharmaceutical companies, and that efforts such as new regulations have been launched to separate any influence of pharmaceutical or commercial interest organisations from developing CME/CPD activities. On the other hand, some also described how pharmaceutical companies can support CME/CPD through independent grants to education providers, can market the CME/CPD events through academic associations, and can, via setting up educational scholarships, provide financial support for physicians and healthcare practitioners to attend CME/CPD activities upon successful application.

Comparison of CME/CPD Systems in China to Best Practices

The CME/CPD systems that support physicians and other health care professionals to engage in life-long learning vary widely across different countries yet are critical to improving health care practice, and patient and population health outcomes. Best practices for CME/CPD systems should demonstrate that they are based on adult learning principles, are aligned with contemporary learning science frameworks, include mechanisms to ensure quality and independence, provide educational opportunities in multiple formats and via multiple modes of delivery, and are easily accessible and affordable. Regulatory mechanisms should be driven by the profession, include methods to validate learner participation, and should be clearly understood by all stakeholders. Systems should incorporate strategies for self-assessment, be based on identified practice gaps for individuals and health care teams, and include evaluation of change (learner, practice, health outcomes). There should be an investment in developing health care professionals as lifelong learners, interprofessional team members, and teachers.

This assessment in China reflects some provinces and municipalities with CME/CPD systems that are relatively mature and identifies several opportunities to expand and enhance the systems to better meet the educational needs of physicians and to positively impact practice and patient outcomes.

The CME/CPD systems across China are structured and regulated, primarily through governmental agencies. The results of this assessment, however, revealed a significant number of respondents who were not aware of or unsure of the CME/CPD systems in their provinces or municipalities which is somewhat surprising since most provinces and municipalities or local employers require participation in CME/CPD as a condition of licensure or as a condition to practice. It may be that the systems are so embedded within the work setting and managed by employers that physicians do not discriminate between employer requirements and CME/CPD systems. It may also be that the concepts of CME/CPD in English and the global north are translated differently into Mandarin and physicians in China may not have recognised that engagement in some types of learning activities in China would be considered CME/CPD elsewhere in the world.

Where CME/CPD systems are integrated into workplace settings, they provide physicians with multiple learning opportunities at the point of care. As the

workload of physicians in China is extremely high, integration of CME/CPD into workplace settings helps to address work–life balance and decreases the need to travel from the work setting to engage in CME/CPD opportunities. There is a formal credit system for CME/CPD in China and most physicians are required to engage in CME/CPD as a condition of licensure. In provinces/municipalities where participation in CME/CPD is not tied to licensure, participation is still strongly encouraged and/or regulated by employers. There are robust systems to track participation when participation is mandatory.

All CME/CPD systems in China report that they offer educational activities via multiple formats and multiple modes of delivery. Physicians who live in the urban setting have more opportunities to engage in CME/CPD as compared to those in more rural settings and the quality of web-based platforms remains a challenge. There has been a concerted national effort to increase opportunities for physicians in rural settings to access and engage in CME/CPD.

The education system in China is described as quite strong and the majority of respondents reported that they were well prepared by their undergraduate and post-graduate training programmes to practice medicine. More than half of the respondents in this survey also reported participating in formal training or coursework in medical education, which is quite high compared to other systems globally.

There is a commitment to limiting the influence of pharmaceutical companies over control of CME/CPD in China, and all provinces and municipalities as described by the In-Country SMEs have implemented laws or regulations to ensure independence. At the national level in China, there are various laws and regulations governing the management and control of continuing medical education, including the Education Law, the Law on Licensed Physicians, and the Provisional Regulations on National Professional and Technical Personnel Continuing Education. Among them, the Law on Licensed Physicians explicitly stipulates that physicians have the right to participate in professional training and receive continuing medical education in their professional activities. It also requires health administrative departments of people's governments at or above the county level to formulate training plans for physicians, conduct various forms of training for them, and provide conditions for them to receive continuing medical education. These laws and regulations provide important legal basis for the implementation of continuing medical education. At the local level, a total of 23 provinces, municipalities, and autonomous regions have issued laws and regulations on continuing education, which provide more specific

and detailed provisions on continuing medical education in accordance with local conditions. Although some regions have not yet issued special laws and regulations on continuing education, they generally follow the national laws and regulations for implementation. Overall, the management and control of continuing medical education in China are comprehensive and multi-level, with uniform regulations at the national level and specific implementation at the local level. The formulation and implementation of these laws and regulations are of great significance for ensuring the quality of continuing medical education, promoting the professional development of health technical personnel, and improving the level of medical services. Respondent descriptions of independent CME/CPD, however, demonstrate that there is an opportunity to validate whether the enacted laws are effective. In addition, because pharmaceutical companies may pay for physician participation and associated expenses for some CME/CPD activities, there is a level of influence that may not be fully recognised.

There was a recognised need to move CME/CPD from a mandatory, credit-based system to one that is more dynamic and better aligned with gaps in practice. This assessment did not explore the extent to which physicians participate in self-assessment of practice gaps and how practice change is assessed over time. This is an area that would benefit from further exploration. There was also a lack of focus or investment in interprofessional education by In-Country SMEs in this assessment, though survey respondents reported a high need. This may reflect the hierarchical nature of professions within China but is an opportunity to explore in the future.

Limitations

There are several limitations to this assessment. Since the survey was disseminated using a snowball strategy, it is not possible to calculate an accurate response rate. By using the number of physicians in China as the maximum number of respondents ($N = 3.87$ million) and the number of respondents to this survey (2951), the response rate is very low, and the results may not accurately reflect the perspectives of the broader physician community. The SMEs participating in the assessment may have a limited or biased perspective of the CME/CPD system and therefore may not reflect the broader physician community. A more rigorous sampling strategy to ensure SMEs and survey participants accurately reflected the population of physicians in China would have increased the validity of these results.

Conclusions

This mixed-method assessment conducted across China and supplemented by provincial and municipal In-Country SMEs reflects a country that is invested in the education of its physician workforce. Academic preparation is standardised and seems to prepare physicians to be lifelong learners and to practice as consultants. The CME/CPD systems have embedded governance structures, organisations that are authorised to provide education, and a recognised credit system. Governing bodies have implemented regulations to limit influence from pharmaceutical or commercial interest organisations on CME/CPD. There is an opportunity to continue to expand delivery systems to reach physicians across diverse geographic regions, to better align content to individual physicians' gaps and learning needs, and to reduce cost so more physicians can access education. There is also an opportunity to explore investing in interprofessional continuing education within a country with a strong professional hierarchy system.

Disclosure Statement

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Appendix. Comparison of CME systems in China

	Beijing (Municipality)	Changsha (Hunan)	Chengdu (Sichuan)	Guangdong (Province)	Hangzhou (Zhejiang)	Shanghai (Municipality)	Xian (Shaanxi)
Municipality/ Province population (source: Statistica) ^a (2019)	21.54 million	69.18 million	83.75 million	115 million	58.5 million	24.28 million	38.76 million
Number of physicians in country/1000 people ^b	2.78*(2019)All of China	2.78*(2019)All of China	2.78*(2019)All of China	2.78*(2019)All of China	2.78*(2019)All of China	3.08(2021)	2.78*(2019)All of China
Academic preparation	2 systems: 8 year (baccalaureate plus medical school) or 5 year (baccalaureate plus fellowship and training)	2 systems: 8 year (baccalaureate plus medical school) or 5 year (baccalaureate plus fellowship and training)	2 systems: 8 year (baccalaureate plus medical school) or 5 year (baccalaureate plus fellowship and training)	2 systems: 8 year (baccalaureate plus medical school) or 5 year (baccalaureate plus fellowship and training)	2 systems: 8 year (baccalaureate plus medical school) or 5 year (baccalaureate plus fellowship and training)	2 systems: 8 year (baccalaureate plus medical school) or 5 year (baccalaureate plus fellowship and training)	2 systems: 8 year (baccalaureate plus medical school) or 5 year (baccalaureate plus fellowship and training)
Licensing or regulatory agency to practice medicine	National Health Commission of the People's Republic of China	National Health Commission of the People's Republic of China	Provincial Ministry of Health	National Health Commission of the People's Republic of China	Health Commission of Zhejiang Province	Shanghai Health Commission	Must pass national exam; government gives license
CME mandatory or not (tied to licensure)	Not mandatory though employer may require; CME opportunities higher in Beijing as compared to other areas	Mandatory to renew licences and required for promotion	Mandatory	Mandatory	Not mandatory	Mandatory	Have to participate in CME; different areas have different requirements
Number of CME credits required annually	25 credits/year	25 credits/year	25 credits/year (first-class: 5-10 credits; second-class: 15-20 credits)	25 credits/year (first-class: 5-10 credits; second-class: 15-20 credits)	25 credits/year (first-class: 5-10 credits; second-class: 15-20 credits)	30 credits/year (thesis, conferences, workshops, training programmes --- depends on the position and quality of the organisers)	Varies depending on employer
Regulatory body for CME requirements for physicians	Chinese Medical Association and Committee of Beijing CPD	Hunan CME Committee	Ministry of Health	Government	Health Commission of Zhejiang Province	National and Provincial Health Commission	Government and hospital have oversight; hospital sets requirements for own physicians

(Continued)



(Continued).

	Beijing (Municipality)	Changsha (Hunan)	Chengdu (Sichuan)	Guangdong (Province)	Hangzhou (Zhejiang)	Shanghai (Municipality)	Xian (Shaanxi)
Regulatory body for CME providers	National Health Commission of the People's Republic of China CME centre	National Health Commission	Chinese Physician Training Academy	National Health Commission of the People's Republic of China	Health Commission of Zhejiang Province	National Health Commission	None
Types of approved CME providers	Chinese Medical Association and Committee of Beijing CPD	Medical Association and Medical Association Certified institution (usually hospitals)	Multiple CME Providers: National/provincial/Municipal health departments, approved training bases	National, provincial and municipal health commissions; hospitals; preventative care institution; colleges and universities; legally registered professional associations and academies	Hospitals, Universities, Social and Academic Organizations	Hospitals and medical associations	Hospitals and medical societies
Types of CME formats/credits	Multiple formats: Conferences, lectures; write research articles, books, get research fund; in-service training; community medical and health care service in rural area	Multiple formats though often workshop or lecture; certified training experiences (e.g. visiting physician)	Multiple formats	Multiple formats	Multiple formats – Class one and Class two	Lectures, simulation, rotations, exams	Multiple formats (conferences, simulation, courses)
How CME credit awarded	Credit: points	Credit points	Credit points (Type 1 and Type 2)	Credit points (Type 1 and Type 2)	Credit points (Type 1 and Type 2)	Credit points	Credit points
Areas of opportunity as described by SME	CME/CPD system currently focused on medical knowledge, skills and attitudes; should expand to include broader focus such as medical, managerial, ethical, social and personal skills; current staff driven to obtain points vs improve knowledge and skills; expanding web based opportunities would increase reach	Opportunity to increase structure of CME/CPD system; less dependence of political decisions, hospital decisions and commercial support; expand opportunities to more physicians; judging the quality of CME/CPD is hard; most of the focus in country is on undergraduate or graduate, not CME/CPD	Unbalanced regional development with high variance in physician competence; fragmented training system; CME/CPD seen as a "formality" and not meeting the educational and practice needs of physicians; need to focus CME/CPD on required competencies for performance; opportunity to learn from existing international systems; need dedicated time and resources for physicians to participate in CME/CPD	Medical technology, scientific research ability and teaching ability vary greatly between regions and institutions, the CME/CPD system needs to be more customised, designed and evaluate dynamically according to the requirements. Information technology facilitates global knowledge sharing, making theoretical progress easier, but it will take time for the capabilities to be improved. "Training the Trainer to Train" effectively improves the efficiency of capacity building, which should occupy a greater proportion in CPD activities.	CME can be tied to licensure in the future	Working to standardise expectations. Opportunities for "Train the Trainer" programmes.	More comprehensive system with CME that is available in more places; more online opportunities; hybrid models are needed (in-person and online)

(Continued).

	Beijing (Municipality)	Changsha (Hunan)	Chengdu (Sichuan)	Guangdong (Province)	Hangzhou (Zhejiang)	Shanghai (Municipality)	Xian (Shaanxi)
Interprofessional opportunities	Very rare; most single profession		Varies by setting; more often in clinical setting	Exists across multiple professions.	Physician and nurses can attend CME meeting together	Exists but needs to be further developed	Good idea and some opportunities exist; have competitions between teams to increase teamwork
Perception of industry supported CME	Pharma cannot provide education directly but can pay physicians to attend a conference	Commercial support is rare	Pharma cannot control content; can help to organise and market; can support travel and other fees	Pharma may not be a provider of CME/CE.	Sponsorship of industry stakeholder is prohibited	Can support but not provide	Unsure

^aAccessed at: <https://data.worldbank.org/indicator/SP.POP.TOTL>

^bAccessed at: <https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?locations=PH>