

Eight-Year Medical Education Program: Retrospect and Prospect of the High-Level Medical Talent Training in China

ECNU Review of Education
2021, Vol. 4(1) 190–209
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DOI: 10.1177/2096531120957665
journals.sagepub.com/home/roe



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Abstract

Purpose: The 8-year medical education program (EYMEP) is China's path to training high-level medical talents. In retrospect, this study systematically reviewed the developmental process of China's EYMEP. The status quo and characteristics, and threats and challenges, were analyzed, along with the program's prospects.

Design/Approach/Methods: This study analyzed relevant textual materials and policy documents dating back to the time of hosting of China's EYMEP, as well as conducted various specific interviews and field trips.

Findings: The exploration of China's high-level medical talent training has been conducted over a century. EYMEP can be divided into five periods: the Only Host Period, the Duplication Pilot Host Period, the Expansion Period, the Joint Exploration Period, and the In-Depth Promotion Period. Currently, there are 14 universities and institutes hosting the EYMEP approved by the Ministry of Education of the People's Republic of China. However, they differ greatly in training ideas and goals,

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enrollment processes, and training phases. China's EYMEP is faced with some external threats and internal challenges. In the future, China's EYMEP should consider five aspects.

Originality/Value: In the new era of the reform and development of China's medical education, a systematic review of the development of EYMEP in China is of great significance to the promotion of high-level medical talent training in China. Meanwhile, the exploration course of China's high-level medical talent training represented by the EYMEP may be an enlightenment for other countries, especially developing countries like China, in their training of high-level medical talents.

Keywords

8-Year medical education program (EYMEP), clinical medicine, high-level medical talents, medical education, retrospect and prospect

Date received: 4 June 2020; accepted: 16 August 2020

Talents are the first resources for health services, and medical education undertakes an important mission of medical talent training. Since the introduction of contemporary medicine, China's medical education has made huge achievements under continuous exploration and reform. Currently, the core health indicators of China outperform those of middle-and high-income countries on average (State Council Information Office of the People's Republic of China [PRC], 2019). Among medical professionals, high-level medical talents decide the quality of medical services, medical science, and technology and guide the future development of medicine. In China, the path of high-level medical talent training, the 8-year medical education program (EYMEP) is a crucial experimental field of top-notch medical innovative talent training (Lin, 2019). The developmental process of the EYMEP embodies China's exploration of high-level medical talent training. On July 10, 2017, the National Conference of the Reform and Development of Medical Education was held in Beijing, after which the General Office of the State Council of the PRC issued *Opinions of the State Council on Deepening the Coordination of Medicine and Education and Further Advancing the Reform and Development of Medical Education* (hereafter referred to as the *Opinions*). The issuance of the *Opinions* has strategic significance for China's medical education, which has entered a new era of reform and development thereafter (Shi et al., 2018). Against this background, the research questions of this article are what kind of development process EYMEP has experienced in China, what are the threats and challenges it faces, and how to develop it in the future.

Developmental process of the EYMEP

Since Peking Union Medical College ran the EYMEP in 1917, China's EYMEP has lasted over a century. The developmental process can be divided into five periods: the Only Host Period (1917–

1978), the Duplication Pilot Host Period (1979–1987), the Expansion Period (2001–2004),¹ the Joint Exploration Period (2004–2018), and the In-Depth Promotion Period (2018 to present).

The Only Host Period (1917–1978)

In 1866, the establishment of Pok Tsai Medical School in the Canton Hospital started the developmental process of China's modern medical education. China's medical education is deeply influenced by churches and the international medical education (Li, 2015). Published in 1910, the Flexner Report led a trend in the reform and development of global medical education (Frenk et al., 2010). In 1914, the China Medical Board of the Rockefeller Foundation (hereafter referred to as CMB) was founded to support China's medical education. CMB acquired the Union Medical College Lockhart Hall hosted by churches, including the London Missionary Society, and renamed it as Peking Union Medical College (Zhang, 2009). After the field trip on China's medicine and medical education, CMB suggested that to train high-level medical talents, the enrollment conditions should follow the requirements of the American top medical colleges (Peking Union Medical College, 1987, p. 6). After relevant registration, in 1917, Peking Union Medical College began to enroll 8-year medical candidates who would be awarded the Doctor of Medicine (MD). This started the journey of China's high-level (modern) medical talent training. Considering China's national conditions and the standards of the Johns Hopkins University School of Medicine (the representative of the American high-level medical colleges then), the EYMEP in Peking Union Medical College upheld the concept of elite education with no more than 30 students enrolled per year (Wu & Dong, 2001, p. 10). From 1917 to 1978, Peking Union Medical College was the only institute to host the EYMEP throughout China. In more than six decades, the EYMEP in Peking Union Medical College experienced several changes. From 1917 to 1925, it hosted the 3-year premedical education program and the 5-year medical education program. From 1925 to 1941, and from 1948 to 1953, the college enrolled candidates who had finished the 3-year undergraduate education program for another 5-year medical education program. From 1959 to 1970, the National College Entrance Examination (NCEE) was held, through which students would receive a 3-year premedical education program in Peking University and then another 5-year medical education program in Peking Union Medical College. Besides, in the periods of 1941–1948, 1953–1959, and 1970–1978, the enrollment of the EYMEP in Peking Union Medical College was halted for the Second World War and some political reasons.

In the Only Host Period, the EYMEP in Peking Union Medical College produced a significant effect, and the college became a top medical school with a considerable influence in China and other parts of the world. Nearly half of China's medical disciplines were established and developed by the graduates from the EYMEP in Peking Union Medical College (Wang & Yin, 2013). It was the significant effect of the EYMEP in Peking Union Medical College that gradually developed

people's awareness that this program is the path to training high-level medical talents in China (Yin, 2012).

The Duplication Pilot Host Period (1979–1987)

After the “Cultural Revolution” was ended in 1976, there was a lack in medical talents, and especially an extreme deficiency of high-level medical talents in China, which seriously affected the development of China's medical sciences (Zhu & Zhang, 1990, pp. 122–123). In 1979, the proposal of the former Tianjin Medical College (in short, TMU, Tianjin Medical University) was approved by the National People's Congress and the College won the right to host the EYMEP. Tianjin Medical College and Nankai University jointly offered the “pilot courses of the EYMEP” and started a small-scale enrollment at that year. Their training model of the EYMEP was a carbon copy of the model of Peking Union Medical College (Yin, 2012).

In 1980, China implemented the academic degree system, in which it took at least 11 years for a student to get their doctoral degree. That EYMEP enabled a candidate to get a doctor's degree in only 8 years was unacceptable to the interested parties. This greatly restricted the pilot host of the EYMEP in other colleges and universities. In 1985, the departments of the State Education Committee of PRC investigated and discussed the medical education system, which was regarded as the argument for expanding the hosting colleges and universities of the EYMEP. This argument ended up with the establishment of China's 7-year medical education program (Yin, 2012). In 1988, the State Education Committee of PRC issued the Circular on Pilot Host of the 7-year medical higher education program, standardizing China's medical higher education system and stipulating that a master degree of medicine will be awarded for those who finished the 7-year medical education program (State Education Committee of PRC, 1988). Tianjin Medical College's EYMEP was terminated due to the 7-year medical education program, while the program in Peking Union Medical College was preserved as a special case.

Tianjin Medical College's EYMEP had only lasted for 8 years, which did not reflect the expected result of talent training. During this period, the EYMEP in Peking Union Medical College was held as usual, whose basic training model was the NCEE enrollment, the 2.5-year premedical education program, and the 5.5-year medical education program.

The Expansion Period (2001–2004)

From 1988 to 2000, only the Peking Union Medical College held the EYMEP. The spread of the EYMEP in the 21st century can be credited to Peking University and Tsinghua University which were approved to host the EYMEP. There are two following reasons which allow the EYMEP to be hosted in other colleges and universities. Firstly, after issuing the *Outline of the Development for the Reform of China Medical Education* (Ministry of Health [MOH] of PRC & Ministry of

Education [MOE] of PRC, 2001), China was fully aware of its shortage of high-level medical talents according to the national conditions and the development trend of world medicine and medical education. Secondly, in China's higher education structural adjustment, university mergers offered an opportunity to host the EYMEP (Hou et al., 2014).

While MOE of PRC approved Peking University to host the EYMEP, Tsinghua University, which has the same reputation as Peking University in China, but didn't own a good medical school, also won the right to host which greatly stimulated other colleges and universities who had long desired to host the EYMEP, and the cry to host the EYMEP was increasingly louder (Yin, 2012). For this reason, in 2003, MOE of PRC conducted the "Research on the Reform of China's Medical Education System and Degree." Based on the full review of literature from China and other parts of the world, as well as field investigation, the research group put forward the assumption and suggestion on the reform of education system with the EYMEP developing as a priority and the 5-year medical education program playing a dominant role (Wen, 2002). In May 2004, MOE of PRC and Department of Degree Management & Postgraduate Education (Office of the State Council Academic Degrees Committee) co-issued the *Circular on Increasing Pilot Schools of Pilot Host of the 8-Year Medical Education (MD)* (in short, the *Circular*) (MOE of PRC, 2004), approving five universities, videlicet, Fudan University, Sichuan University, Sun Yat-sen University, Huazhong University of Science and Technology, and Central South University, as the demonstration pilot universities to host the EYMEP (MD). MOE of PRC required the pilot universities to strictly control the enrollment scale and highlighted the hosting principle of "8-year consistency, integral optimization, foundation enhancement, clinic orientation, ability training and quality improvement." Each university can host the program practically and characteristically. Meanwhile, four military medical universities also won the right to host the EYMEP. In 2005, as Shanghai Second Medical University merged with Shanghai Jiao Tong University, Shanghai Jiao Tong University was approved to host the EYMEP. In the same year, Zhejiang University also launched the EYMEP (officially approved in 2011). By then, 14 colleges and universities had been approved to host the EYMEP, which lays the foundation for China's EYMEP, in other words, the basic pattern of high-level medical talent training in China.

The Joint Exploration Period (2004–2018)

Since the issuance of the *Circular* in 2004, China's EYMEP has entered the Joint Exploration Period, which is intensively reflected in the holding of the China's 8-Year Medical Education Summit. In July 2004, Peking University initiated and held the 1st China 8-Year Medical Education Summit. The Summit had a heated discussion on the issues concerning the EYMEP and believed that the program is a key component of the reform of medical education, which helps improve China's comprehensive level of medical education. According to the Summit, it was

Table 1. Basic information of China's 8-Year Medical Education Summits.

Order	Time	Organizer(s)	Topic
1st	July 2004	Peking University	Exploration of the EYMEP
2nd	July 2005	Central South University	Premedical Education in the EYMEP
3rd	July 2006	Huazhong University of Science and Technology	The Training Goals of EYMEP and Basic Medicine Education
4th	July 2007	Sichuan University	Basic Requirements and Degree Awarding Conditions of Graduates from the EYMEP
5th	August 2008	Fudan University, Shanghai Jiao Tong University, Naval Medical University	Curriculum System Building and Integration of the EYMEP
6th	November 2009	Sun Yat-Sen University	Training Goals and Basic Requirements in the Clerkship Rotation and Intercollegiate Exchange Student Training of the EYMEP
7th	May 2012	Zhejiang University	Retrospect and Prospect of the EYMEP
8th	October 2018	Peking Union Medical College	Retrospect of the Developmental Process of the EYMEP Conclusion of Successful Experience in International Medical Education Discussion and Suggestion on the Reform of 8-Year Medical Education

Note. EYMEP = 8-year medical education program.

necessary to set up a regular exchange mechanism by holding regular summits on the EYMEP (Medical Education, 2004). The basic information of successive China 8-Year Medical Education Summits is presented in Table 1.

Since the first Summit, the training phases or key issues of the EYMEP were discussed. The *Circular* issued in 2004 stated that “the teaching plan of the EYMEP is drafted on the situations of universities and colleges according to ‘Basic Requirements for the EYMEP (doctor of medicine)’ and ‘Standards for Awarding the Degree of Eight-Year Doctor of Medicine (both further issued)’.” But these two schemes have not been drawn up in the successive Summits. Also, “Training Goal and Basic Requirements for Clinical Teaching of the EYMEP” proposed in the sixth Summit has not been officially issued by MOE of PRC.

Besides, after the seventh China 8-Year Medical Education Summit, the authority did not issue relevant documents on the EYMEP, instead the medical talent training model of “5 + 3” (5-year undergraduate and 3-year residency) and the standardized resident training system were implemented, which resulted in new difficulties and problems in the EYMEP. A discussion on whether the

EYMEP should be continued was raised thereafter. In September 2017, the Department of Higher Education of MOE of PRC authorized the Working Committee for the Accreditation of Medical Education, MOE, to host the Forum of the EYMEP, aiming to discuss the future development direction and ways of reform. The Forum reached a consensus on persisting in the EYMEP.

In this Period, apart from the 14 approved colleges and universities, Nanjing University, Xi'an Jiaotong University, Jilin University, Shandong University, and Wuhan University also hosted the EYMEP in different forms. In this Period, in 2012, *Opinions of the MOE and Former MOH on Implementing the Comprehensive Reform of Clinical Medical Education* was issued, according to which several colleges and universities will become the demonstration pilot units of top-notch innovative talent training supported by the colleges and universities hosting the EYMEP. In 2014, MOE of PRC and other five departments issued *Opinions on the Coordination of Medicine and Education for Deepening the Reform of Clinical Medical Talent Training*, stating that it is necessary to reform and innovate the 8-year clinical medical talent training model as well as encourage colleges and universities hosting the EYMEP to explore effective methods to train multidisciplinary high-level top-notch innovative medical talents.

The In-Depth Promotion Period (2018 to present)

Since 2018, China's EYMEP has entered the In-Depth Promotion Period. To further implement the policies of the National Health Conference and *Opinions of the State Council on Deepening the Coordination of Medicine and Education and Further Advancing the Reform and Development of Medical Education*, according to *Opinions of the MOE on Accelerating to Build High-Level Undergraduate Education Programs to Comprehensively Enhance the Talent Training Capacity*, in October 2018, *Opinions of the MOE, National Health Commission, and National Administration of Traditional Chinese Medicine on Enhancing the Coordination of Medicine and Education and Implementing the Outstanding Doctor Education Program 2.0* was issued. It suggested deepening the reform of top-notch innovative medical talent training, promoting the reform of the EYMEP, laying a solid foundation for the candidates' comprehensive growth, improving their clinical capabilities, developing their potential of clinical scientific research, and broadening their international horizons so as to train fewer but better high-level quality and international leading talents in medicine.

After the eighth China 8-Year Medical Education Summit, Peking Union Medical College took the lead in drafting *Standards for the 8-Year Clinical Medical Education (first draft)* and *Guiding Opinions on Further Improving the 8-Year Clinical Medical Professional Talent Training (exposure draft)*, but no consensus was reached on the two drafts, and the education authorities did not issue corresponding documents. In November 2019, the Chairman of Committee of Medical Education Experts of MOE of PRC and former Vice Minister of Education Lin Huiqing revealed

that MOE of PRC will further strengthen the cooperation with NHC of PRC and Chinese Academy of Engineering. All sides have established a special research topic to conduct a systematical and in-depth study on the EYMEP, expecting to set the standards for degree awarding of the EYMEP as a reference for the reform of the EYMEP in relevant colleges and universities (Beijing Daily, 2019).

Status quo and characteristics of the EYMEP

Currently, there are 14 approved colleges and universities hosting the EYMEP in China, enrolling almost 1,000 candidates nationwide. Generally, the EYMEP follows the requirements in the *Circular* issued in 2004, aiming to train high-level medical talents, but in reality, differences exist in practice among colleges and universities (Wu & Wang, 2018). The core focus of the EYMEP lies in the talent training model, and the reform exploration and in-depth promotion of the program demands for a consensus on talent training. In accordance with the basic connotation of the talent training model and the practice of the EYMEP in China, this study built an analytical framework of the factors in China's EYMEP (see Figure 1).

Among the factors in the analytical framework, to analyze the status quo and characteristics of China's EYMEP, the most controversial and discussed components in this framework, including training ideas and goals, enrollment processes, and training phases, are selected.

Training ideas and goals

Training ideas and goals of the EYMEP in different colleges and universities follow the hosting principle stipulated in the *Circular* overall; however, there are some specific variations. This study cited the training ideas and goals of several medical colleges as examples. The training goal of Peking Union Medical College is to lay a solid foundation for medical knowledge and proficient skills in clinical diagnosis and treatment and to develop innovative thinking and scientific research capabilities, so as to become a high-level medical talent with a doctoral degree in clinical medicine. Its methodology is to breed "medical leaders." Adhering to the thought of holistic education, Peking University's training goal is to train quality medical talents with a solid theoretical foundation, strong clinical capabilities, scientific research abilities, innovative spirit, good communication skills, team spirit, international outlook, and development potential. The training goal of Tsinghua University's EYMEP is to develop physician scientists.

By analyzing training ideas and goals of the EYMEP in different colleges and universities, it has been found that although the general descriptions are different, there are several common points. For example, in the expression of training ideas and goals, six medical schools use the key words "high-level," "innovation," and "future-oriented." In addition, since the pilot host of the EYMEP, most colleges and universities have adjusted their training ideas and goals. For example,

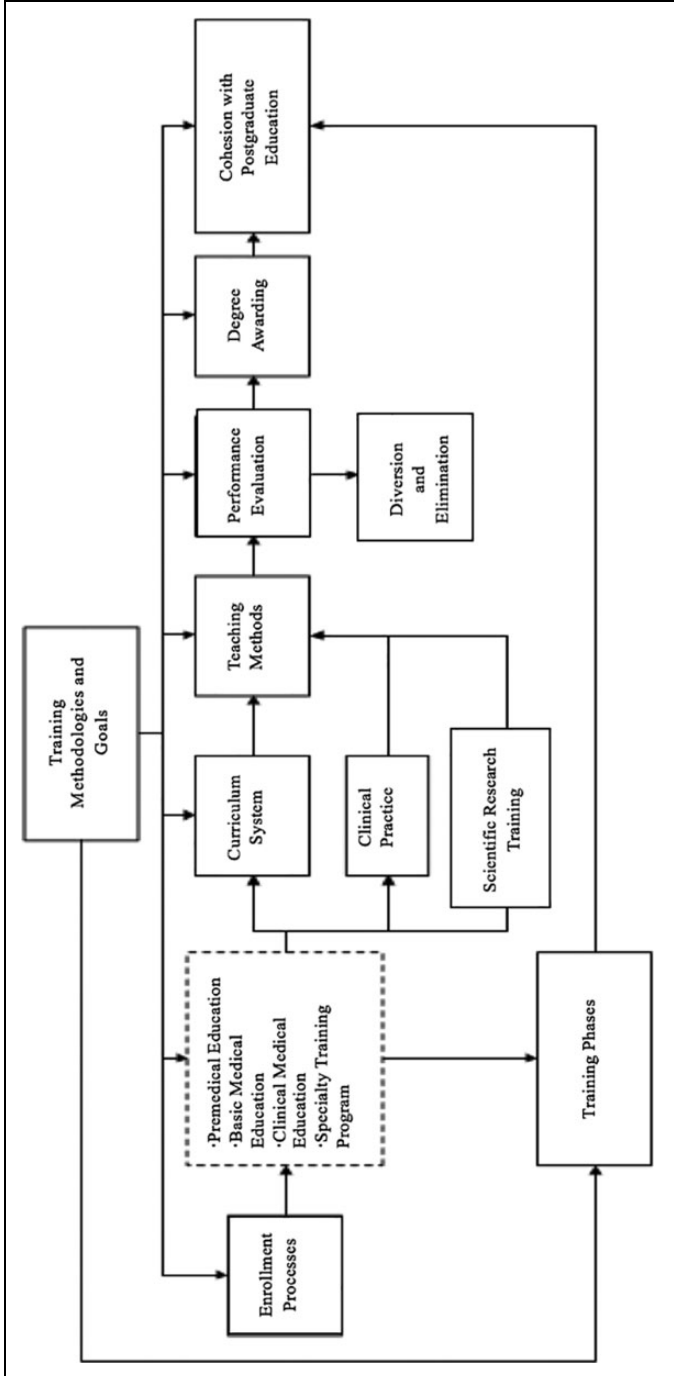


Figure 1. Analytical framework of factors in China's EYMEP. EYMEP = 8-year medical education program.

Table 2. Enrollment processes of the 8-year medical education program in 14 colleges and universities.

Names of colleges and universities	Source of candidates	Enrollment methods	Enrollment quota (persons)
Peking Union Medical College	Senior high school graduates	NCEE	60
	Seniors	Comprehensive enrollment	30
Peking University	Senior high school graduates	NCEE	140
Fudan University	Senior high school graduates	NCEE	150
Sichuan University	Senior high school graduates	NCEE	70
	Sophomores	Comprehensive enrollment	20
Sun Yat-sen University, Huazhong University of Science and Technology, Central South University	Senior high school graduates	NCEE	100
Southern Medical University	Senior high school graduates	NCEE	120
The Second Military Medical University	Senior high school graduates	NCEE	40
The Third Military Medical University, Air Force Medical University	Senior high school graduates	NCEE	20
Shanghai Jiao Tong University	Senior high school graduates	NCEE	160
	Graduates	Comprehensive enrollment	25
Zhejiang University	Senior high school graduates	NCEE	70
Tsinghua University	Senior high school graduates	NCEE	30

Note. The data are arranged according to the materials of different colleges and universities reported to the eighth China 8-year Medical Education Summit. NCEE = National College Entrance Examination.

since the pilot host of the EYMEP in 2001, Peking University adjusted its training plan 5 times, with corresponding changes in its training ideas and goals.

Enrollment processes

The enrollment processes of the EYMEP focus on the sources of candidates, enrollment methods, and enrollment quota. The enrollment processes of the EYMEP in 14 colleges and universities are detailed in Table 2. The major source of candidates for the EYMEP is graduates from senior high schools. From 2018, Peking Union Medical College started the pilot class and planned to enroll the seniors aspiring to a medical career from nonmedical majors in Peking University, Tsinghua University, and University of Science and Technology of China in a doctoral program in clinical

medicine. In 2008, Sichuan University founded the “Eight-Year Innovation Class” to select outstanding students aspiring to a medical career, with a quota of no more than 20 per year (Peng et al., 2018). Shanghai Jiao Tong University selected and enrolled a few outstanding undergraduates from universities in the doctoral program in clinical medicine. Regarding the enrollment methods, graduates from senior high school are enrolled in line with their NCEE preferences, while the comprehensive enrollment processes are carried out via interview. In the enrollment quota, the three military universities set a relatively small quota, other colleges and universities enroll about 100 candidates, and Shanghai Jiao Tong University has relatively large-scale enrollment.

Training phases

The training phases can be divided into premedical education (liberal education), basic medical education, and clinical medical education. The clinical medical education includes clinical medicine (including courses and the internship program) and clerkship rotation (general practice; Schwarz et al., 2004). For the EYMEP, colleges and universities may include the specialty training program to cohere with the standardized resident training in the postgraduate education. The training phases of different colleges and universities can be seen in Table 3. At each phase, no college or university lists scientific research training separately, which means the training “runs throughout” the whole program.

In the premedical education program, the training takes 1–4 years, mostly 2 years. The premedical education program in Zhejiang University takes 4 years. In the EYMEP, graduates from senior high school complete other courses and get a bachelor’s degree in nonmedicine major before their 4-year medical study. Colleges and universities are focusing on the reform of the integration of basic medicine and clinical medicine; therefore, the training phases of basic medicine and clinical medicine in some schools cannot be clearly identified. Basically, the clerkship rotation lasts for a year. As for the phase of the specialty training program, the length of programs in Peking University and Shanghai Jiao Tong University is 3 years, and that in other colleges and universities is 2 years. Peking Union Medical College, Tsinghua University, and Zhejiang University have not included the specialty training program. A majority of colleges and universities include the scientific research training in the specialty training program. Tsinghua University offers 2-year scientific research training in the middle of the program. Besides, after the pilot host of the EYMEP, different colleges and universities have changed the duration of the training phases. For instance, before 2007, the premedical education program in Peking University lasted for 2 years.

Different colleges and universities are distinctive in training ideas and goals, enrollment processes, and training phases, but overall, they have the following common characteristics. Firstly, the goal is to train high-level, outstanding, and innovative medical talents; however, there is a

Table 3. Training phases of the 8-year medical education program in 14 colleges and universities.

Names of colleges and universities	Training phases (years)
Peking Union Medical College	2.5 (premedical education) + 1.5 (basic medicine) + 2 (clinical medicine) + 2 (clerkship rotation, scientific research training)
Peking University	1 (premedical education) + 1.75 (basic medicine) + 2.25 (clinical medicine, clerkship rotation) + 3 (specialty training program)
Fudan University	2 (premedical education) + 3 (basic medicine, clinical medicine) + 1 (clerkship rotation) + 2 (specialty training program)
Sichuan University	2 (premedical education) + 2.5 (basic medicine, clinical medicine) + 1 (clerkship rotation) + 2.5 (specialty training program, scientific research training)
Sun Yat-sen University	2 (premedical education) + 2 (basic medicine) + 2 (clinical medicine, clerkship rotation) + 2 (specialty training program)
Huazhong University of Science and Technology, Central South University, Southern Medical University, the Second Military Medical University, the Third Military Medical University, Air Force Medical University	2 (premedical education) + 3 (basic medicine, clinical medicine) + 1 (clerkship rotation) + 2 (specialty training program, scientific research training)
Shanghai Jiao Tong University	1 (premedical education) + 3 (basic medicine, clinical medicine) + 1 (clerkship rotation) + 3 (specialty training program, scientific research training)
Zhejiang University	4 (premedical education) + 3 (basic medicine, clinical medicine) + 1 (clerkship rotation)
Tsinghua University	3 (premedical education, basic medicine) + 2 (scientific research training) + 3 (clinical medicine, clerkship rotation)

Note. The training phases of Peking Union Medical College and Shanghai Jiao Tong University are for graduates from senior high school.

divergence in training clinical physicians, medical scientists, or physician scientists. Secondly, they all uphold the concept of elite education and small-scale enrollment to ensure the outstanding sources of candidates. It can be argued that most outstanding candidates are enrolled in the EYMEP, and colleges and universities competent to host the EYMEP are deemed representatives

of high-level medical colleges. For either colleges and universities or students, the EYMEP has become the symbol of the “elite.” Thirdly, all colleges and universities are positively exploring reform of the EYMEP. They are especially attentive to the integration of foundation courses and clinical courses as well as scientific research training. Some students have already made high-level scientific research achievements. Fourthly, graduates can be directly awarded the MD, which saves considerable time compared to the general training of medical talents. Also, according to the schedule of the specialty training program, the graduates must finish the standardized resident training in some way.

External threats and internal challenges of the EYMEP

Twenty years have passed since the expansion of the EYMEP in 2001. In these 20 years, discussions and explorations on the EYMEP have never ceased. Through the analysis, current problems of China’s EYMEP can be divided into external threats and internal challenges.

External threats

The external threats are reflected in the current policies and systems: to be specific, the standardized resident training system, the “5 + 3 (5-year undergraduate and 3-year residency)” model (hereafter referred to as the “5 + 3” model; Zhu et al., 2016), and the training system of MD candidates.

The standardized resident training is a vital part of China’s postgraduate medical education, which is the only path to training qualified clinical physicians (Qin, 2017). To ensure a basic minimum of quality among doctors, in 2013, China embarked upon a nationwide reform of medical education, called “5 + 3,” encompassing 5 years of undergraduate medical study and 3 years of residency. During the pilot host of the EYMEP, colleges and universities found that the standardized resident training after the EYMEP will reduce the program’s attraction, which requires the cohesion between the EYMEP and standardized resident training. From Table 3, it can be seen that there are differences in the cohesion timing among different colleges and universities. The standardized resident training corresponding to the rotation of the specialty training program is a common ground between colleges and universities and the local health authorities. Some colleges and universities are exploring the issue of cohesion in postgraduate education by way of clinical postdoctoral system.

The “5 + 3” model refers to the transformation and adjustment of China’s 7-year medical education program. The qualifiers in the 5-year undergraduate period directly enter the training phase of the 3-year program of professional master in clinical medicine, which coheres with the standardized resident training, and they will be awarded the certificate of the professional master’s degree and the certificate of the standardized resident training after graduation (Zhu et al., 2016). In 2015, MOE of PRC issued *Circular on Improving the Reform of Shift from 7-Year Clinical*

Medical Education to the “5 + 3” Talent Training Model, highlighting that from 2015. The length of the “5 + 3” model is 8 years, which unavoidably mixes up with the EYMEP.

According to China’s academic degree system, there are professional doctoral degrees and academic doctoral degrees in the training of MD. For clinical medicine, the 8-year MD is faced with a pincer attack from Doctors of Philosophy (PhD) in Clinical Medicine and Professional Doctorates in Clinical Medicine. The former focuses on scientific research capabilities while the latter on clinical skills. Regarding the training length, it takes 11–12 years to finish either doctoral program, which is obviously longer than the EYMEP. So, the EYMEP is not on a par with the program of PhD in Clinical Medicine for scientific research capabilities and does not rival the program of Professional Doctorate in Clinical Medicine in clinical skills. Moreover, there is the program of PhD in Basic Medicine in China. This topic also deserves further exploration to examine the distinction between the two programs.

Internal challenges

Regarding the EYMEP, internal challenges come from these aspects, like the goal and positioning, degrees, training phases, and administrative mechanism.

The prior internal challenge of the EYMEP lies in its goal and positioning. The *Circular* issued in 2004 indicated that colleges and universities should be realistic and distinctive in hosting the program. There are differences in the goal and positioning of the practice and exploration of the EYMEP among different colleges and universities. Such differences are mainly reflected in the training of high-level clinical physicians, medical scientists, and physician scientists, which, respectively, focus on clinical capabilities, scientific research capabilities, and the combination of both. In 2017, the *Opinions* issued by the General Office of the State Council of PRC described the training goal and positioning of EYMEP as to train compounded high-level medical talents with a solid theoretical foundation and strong clinical comprehensive skills. *Opinions of the MOE, National Health Commission and National Administration of Traditional Chinese Medicine on Enhancing the Coordination of Medicine and Education, and Implementing the Outstanding Doctor Education Program 2.0* described the training goal and positioning as to train high-level, high-quality, and international leading medical talents. Further studies on how to reflect such goals and positioning in the education plan and talent training model should be conducted. In practice, the training goals and positioning of the EYMEP in colleges and universities are influenced by their 7-year medical education programs and the reform and development of medical education in and outside China. Lacking unified standards and requirements, EYMEP in different colleges or universities are differentiated, thus leaving the impression of being disordered with no clear training goals and positioning in this program.

In degree awarding, according to the *Circular*, the EYMEP should award candidates MD degrees. How should colleges and universities train the candidates from such a doctoral program?

What are the requirements of awarding degrees? Since the two documents mentioned in the *Circular* have not yet been formulated, there is controversy over the degree awarding of the EYMEP. In practice, although EYMEP award candidates the degree of Professional Doctorate in Clinical Medicine, it is not equal to the professional doctoral degree. It takes a candidate at least 11 years to get a degree of Professional Doctorate in Clinical Medicine since their graduation from senior high schools, while it only takes 8 years to study an EYMEP. The two programs are unavoidably different in the training requirements and results. The recent years' random inspection of dissertations showed that based on the current degrees awarded, the dissertations of 8-year medical doctors in many colleges and universities failed to meet the standards. This situation further reflects the issue concerning degree awarding of the EYMEP.

The training phases reflect the basic training models. At present, there are the "4 + 4" "1 + 4 + 3" "2 + 4 + 2" models of the EYMEP in different colleges and universities. As is mentioned above, there is more than one training phase. Different colleges and universities have different training stages, especially in the premedical education program and the specialty training program. Premedical education lasts 1–4 years, and it is adjusted continuously in the pilot host process. The 4-year premedical education program raises the question on the starting point of the EYMEP: Should the program start from graduates of senior high schools or graduates with bachelor's degrees? Considering the developmental process of the EYMEP and China's national conditions, EYMEP should develop students' solid theoretical foundation, and premedical education is a necessary step to lay such a foundation for them. In the specialty training program, the differences among colleges and universities are obvious. Such differences involve the cohesion with postgraduate education. Also, colleges and universities have different understandings of scientific research training. In addition, many of them are exploring the integration of basic medical courses and clinical medical courses, but the scientific and effective way is to be discovered.

Finally, the administrative mechanism, EYMEP, enrolls graduates from senior high schools. It is a long-term education program administered by the Department of Higher Education of MOE of PRC. However, EYMEP involves the postgraduate phase or the postgraduate education phase, which, on a macro aspect, leads to an unsmooth administrative mechanism of the EYMEP. Besides, the EYMEP is mainly hosted by universities. Nevertheless, before the *Opinions* was issued by General Office of the State Council of PRC in 2017, the administrative mechanisms of medical education were undefined and greatly differed between universities. Such a status results in the obvious differences in the administration of medical education among colleges and universities. In the implementation process, the involved administrative departments include teaching affairs offices, the education offices of the schools of medicine, medical education administrative offices, graduate schools, and undergraduate schools.

Future prospects of the EYMEP

Higher medical talents concern the implementation and promotion of a healthy China and scientific and technological power. *Opinions of the State Council on Deepening the Coordination of Medicine and Education and Further Advancing the Reform and Development of Medical Education* issued in 2017 and *Opinions of the MOE, National Health Commission and National Administration of Traditional Chinese Medicine on Enhancing the Coordination of Medicine and Education, and Implementing the Outstanding Doctor Education Program 2.0* issued in 2018 pointed the way for the reform and development of the EYMEP. With the developmental process, status quo, and characteristics, as well as the external threats and internal challenges of the EYMEP combined, the prospects of China's EYMEP are raised as follows.

Identifying the training goals and setting degree requirements

On the training goals, it is necessary to fully realize that the 8-year medical talents are distinctive in a solid theoretical foundation, strong clinical comprehensive capabilities, potential in clinical scientific research, and international horizons. They are high-level top-notch innovative talents with much potential who can drive and lead the future development in medical sciences. It is necessary to fully identify the goal of EYMEP to train high-level medical leading talents. EYMEP can stick to the hosting principle of “eight-year consistency, integral optimization, foundation enhancement, clinic orientation, ability training, and quality improvement” and set a specific training goal according to the target talents. In line with the requirements of the training goal, it is necessary to further innovate the training model, optimize the training plan, and reform the curriculum to continuously improve the quality of the 8-year medical talent training. The requirements of degree awarding of MD should be set according to the training goals of the EYMEP. The 8-year MD should be different from PhD in Clinical Medicine and Professional Doctorate in Clinical Medicine. Under the existing conditions, the degree of MD can be awarded in-line with the requirements of degree awarding of Professional Doctorate in Clinical Medicine, but a transition should be made therefrom and finally the requirements of degree awarding of MD from the EYMEP should be adopted.

Upholding elite education and exploring diversified enrollment processes

According to China's current economic growth and social development, it is hard to comprehensively carry out elite education in medical education. Nevertheless, EYMEP must uphold the philosophy of elite education. The *Opinions* indicated that it is necessary to strictly control the college quantity and enrollment scale of EYMEP. Multiple measures should be taken to positively attract the most outstanding students. Given that China's graduates from senior high schools do not have a firm ambition or strong interest in medicine (Fan et al., 2017), it is acceptable to explore diversified enrollment processes. Based on current conditions, the enrollment process of graduates from senior high schools, as the

primary methods, can be maintained, but the enrollment rules can be adjusted. For example, adding an extra examination to the NCEE mechanism to enroll appropriate candidates in the EYMEP. Also, explore the possibility of enrolling undergraduates aspiring to a medical career in EYMEP. For the enrollment processes of undergraduates, the enrolled students should be equivalent to those having finished premedical education in EYMEP in knowledge grasping and comprehensive quality.

Standardizing the training phases and encouraging characteristic development

According to the training goals, status quo, and characteristics of EYMEP, it is necessary to unify the requirements of the EYMEP in key steps to standardize the training phases. It is suggested that premedical education last no less than 2 years. It is necessary to fully realize the significance of premedical education in laying a solid foundation for the comprehensive growth of medical candidates and developing their multidisciplinary and innovative thinking. The curriculum of premedical education should focus on humanities and social sciences as much as possible, as well as strengthen students' scientific academic training and improve their natural scientific literacy. Universities should use their disciplinary powers to their full potential, and self-established medical colleges should be encouraged to join premedical education offered by high-level universities. The courses of basic medical education and clinical medical education should be fully integrated and cohered with clerkship rotation, all of which takes about 4 years, which is vital for the basic training of medical education for students. Students who fail to finish their study will be diverted. For the last 2 years, students can spend a year on the standardized resident training and another year on scientific research training and dissertation preparation. Undoubtedly, scientific research training should run throughout the process. For instance, it is necessary to cultivate students' interests in scientific research in the phase of premedical education. Apart from standardizing the training phases, colleges and universities can start from their own conditions to host characteristic and quality programs, following the principle of "a consistent goal, characteristic development, standardized phases and unified quality."

Allowing policy space and coordinating with existing systems

Since the EYMEP is inconsistent or uncoordinated with China's current policies and systems, the program's further development should focus on the developmental trend and future direction of international medical education. Certain policy space should be given for the program to coordinate with the existing systems. As is stated in "External threats," first, in standardized resident training, it is necessary to send graduates from the EYMEP to standardized resident training. Considering the particularity of EYMEP, it is necessary to raise the treatment for graduates in the standardized resident training by setting specific treatment standards, and then the coordination with the "5 + 3" model. This is mainly reflected in the enrollment processes, training models, and the cohesion with postgraduate education. In enrollment processes, it should be stipulated that the

EYMEP should be different from the “5 + 3” model in the training phases and the curriculum system. In the cohesion with postgraduate education, the standardized resident training between the two types of graduates should be differentiated clearly. At last, for the coordination with the existing MD training system, firstly, we should identify the corresponding standards for each year of the EYMEP. For instance, the first to fifth year can be aligned with the undergraduate phase and the sixth to eighth year, the doctoral phase. Secondly, we should identify the differences among the 8-year MD, PhD in Clinical Medicine, Professional Doctorate in Clinical Medicine, and PhD in Basic Medicine and standardize the EYMEP according to its standards and degree requirements.

Establishing organizations and institutes and promoting mutual development

In the In-Depth Promotion Period, it is necessary to establish a relevant organization, such as the cooperative group or alliance of the EYMEP, to jointly promote the program. Depending on the organization, members can conduct peer reviews, consistent performance checks, and interacademic dissertation defense. Meanwhile, through the organization, members can draft the “Basic Requirements for the EYMEP (MD)” as well as “Standards for Awarding the Degree of 8-Year Doctor of Medicine,” which are not formulated after the issuance of the *Circular* in 2004 and other necessary guiding opinions on the EYMEP. The organization aims to standardize the training model of the EYMEP, facilitate colleges and universities to organize and host the program in a proper way, as well as improve the quality of hosting the program, so as to push forward the healthy, sustainable, and orderly development of the EYMEP.

Conclusions

Among medical professionals, high-level medical talents play a vital role. The EYMEP, as the path of high-level medical talent training in China, has been conducted over a century. This study systematically reviewed the developmental process of EYMEP. The status quo and characteristics and threats and challenges were analyzed, along with the program’s prospects. The process of EYMEP can be divided into five periods. Currently, there are 14 universities and institutes hosting the EYMEP approved by the MOE of PRC. As for EYMEP, the external threats are reflected in the current policies and systems, like “5 + 3” policy and the existing academic degree system in China. Meanwhile, internal challenges come from the goal and positioning, degrees, training phases, and administrative mechanism. At last, five prospects of China’s EYMEP are raised. We believe in the new era of the reform and development of China’s medical education, a systematic review of the development of EYMEP in China is of great significance to the promotion of high-level medical talent training in China. Also, the exploration course of China’s high-level medical talent training represented by the EYMEP may be an enlightenment for other countries, especially developing countries, in their training of high-level medical talents.

Authors' note

This article is partially based on the authors' recent study which will be published as a Chinese-language article in the *Chinese Journal of Medical Education*. The use of this version has been authorized by *Chinese Journal of Medical Education* and acknowledged by *ECNU Review of Education*.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Key Project for Medical Education Research in 2018 of the Medical Education Branch of the Chinese Medical Association and Specialty Committee of Medical Education in China Association of Higher Education (2018A-N02095).

Note

1. From 1988 to 2000, only the Peking Union Medical College held the 8-year medical education program.

Contributorship

Hongbin Wu and Weimin Wang conceived the idea and designed this study. Wu wrote the first version of the manuscript. Ana Xie was involved in data acquisition and revising. Wu, Xie, and Wang revised the manuscript and approved the final version.

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