



Diversity and more investment needed in Chinese medical education

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Received: 17 April 2017; Accepted: 20 June 2017; Published: 04 July 2017.

doi: 10.21037/aes.2017.06.11

View this article at: <http://dx.doi.org/10.21037/aes.2017.06.11>

China has the largest population in the world and has a huge medical needs. Research on China's health workforce indicate that China encounter problems of shortages, imbalances and maldistribution in medical resources. Until 2014, China's total health workforce are 10.2 million, of which licensed doctors are 2.4 million and licensed assistant doctors are 0.5 million (1). Most of these doctors are distributed in state-owned health institutions in relatively developed areas, working as civil servants, rather than independent medical professionals. Taking eye care as an example, there was only about 26 ophthalmologists per million population in China according to the latest domestic survey in 2016 (2). And it is reported that cataract surgery rate in China is lagging behind. Only 1,425 people per million received cataract surgery in 2014, while about 5,000 people per million receive such surgery in India and 8,000 people in the US every year (3). Additionally, China has been suffering a high attrition rate among physicians and medical graduates over the past 10 years, going with low physician production, and rapid population growth (4). Based on its national conditions, China institute double reforms of its health-care systems and medical education.

The shortage of primary medical care and the Chinese experience

Chinese medical education has long been mass education. To provide primary health care and basic medical services for the community is the elementary objective, due to the lack of medical investment, large population, and the overall low level of education in China.

In the early days after the founding of new China,

the rural areas lack of basic medical care. Therefore, the program of barefoot doctors launched as a national policy focused on quickly training paramedics to meet rural needs. The candidates were those who came from medical families or high school graduates. They were then received about 6 to 18 months of training at a county or community hospital, focusing on epidemic disease prevention (5), curing simple ailments that were common in the specific area, and to use Western medicines and techniques (6). For a long time, millions of the informal doctors who were not included in the national system provided the basic medical services and health education for most peasants. They implemented the planned immunization, improve the rural health environment and completed many other aspects of health care. Rather than treatment, barefoot doctor focused more on prevention.

This low-cost medical assistance system which providing the basic epidemic prevention with wide coverage was widely recognized by the international community. WHO regarded China's barefoot doctor system as a successful example of solving shortages of medical service in developing countries. As the reforms in the health-care system, the title of barefoot doctor was cancelled by the Ministry of Health in 1985.

To qualify the medical business and to build National Medical Licensing system

After the primary care shortage was solved, better medical service was in demand. Based on national conditions, China adapted a complex medical education system mainly from the British system. For medical training time, high school

graduates can choose 3-year program in technical schools, 5-year program as undergraduates, 7-year program as post-graduates or 8-year program as doctors of clinical specialty in colleges.

As to the medical discipline, in addition to clinical medicine, imaging, clinical laboratory, anesthesia, TCM (traditional Chinese medicine) and ophthalmology & optometry are included in medical education. The ophthalmology & optometry discipline create a “Chinese model” of optometry professional education. In China, ophthalmologist is not only engaged in the diagnosis and treatment of eye diseases, but also undertake part of the optometry work. Therefore, Ophthalmology & Optometry discipline is innovative combination of clinical ophthalmology and optometry. The doctor who participated in the project is expected to be able to complete the ophthalmic surgery as well as visual health protection.

Upon graduation, the graduates were qualified to work in the hospitals under supervision. After at least one-year practice, the graduates gained the permission of taking the National Medical Licensing Examination (NMLE) for physician certification. However, American type of residency training had not been implemented nationwide in Chinese hospitals until 2016.

On the other side of the ocean, the US physicians are being trained in a very different system. Almost a century ago, Abraham Flexner, a research scholar at the Carnegie Foundation for the Advancement of Teaching brought the modern medical education reform to the United States. He thought that the kind of thinking integral to the natural sciences, should hold pride of place in the intellectual training of physicians (7). From then, the US medical training began to be more likely to a university-based system, rather than a simply skill-training system.

The main differences of medical education between China and US are in two aspects: the systems and the goals. In terms of systems, the US are relatively more organized. Since the US medical degrees are classified as Second entry degrees, students are usually required to complete at least 3 years of “pre-med” course before applying the medical school. However, the application is getting more and more competitive. Some of the applicants even gain master degrees. Once enrolled in a medical school, the four years study is divided into two parts: pre-clinical (courses of basic science including biochemistry, pathology, etc.) and clinical (rotation in a teaching hospital). During the last year of medical school, students apply for postgraduate residencies in their chosen field of specialization (8). In the first year of

residency, most of the new physicians will complete their internship requirement, which is the minimum training requirement for obtaining a general license to practice medicine. The curriculum varies among each of the specialties. Programs range from 3 to 7 years

When it comes to the goals of medical education in the US, it can be described as: to transmit knowledge, to impart skills, and to inculcate the values of the profession (7). They believe that responsibility for the care of patient is a powerful stimulus for learning. Two decades ago, the hours worked was regarded as a simple proxy for dedication to patients. However, now, what it means to be dedicated to one’s patients is redefined: more rigorous assessment to inspire learning, reinforce competence, and reassure the public; meanwhile, more emphasis is placed on the social, economic, and political aspects of health care delivery.

Contrast to the mediocre quality that Abraham Flexner criticized a hundred years ago, the nowadays idea of US medical education is to choose the best students, to train the best physicians, and to provide the best medical care.

With the increasing demand of providing the best medical care to each patient in China, our medical education system has also gradually unified with the international standards. In 2016, the National Health and Family Planning Commission issued its guidance for standardized medical training which are similar to the training programs of the US system. The Chinese government hopes to standardize and improve the clinical and practical skills of medical graduates through these training programs. However, such training programs face a lot of challenges in China.

Firstly, the absence of detailed and normative guidance make this training system less effective. In US residency program, the training plan were designed detailedly, including in wards, operating room, clinic, consults, teaching, rounds and on-call. For example (9), in the ophthalmology program, trainees were require to be able to prep the patients and do minor surgeries e.g., chalazion in the part of “operating room” in the first year (PGY-1). In the PYG-2, the residents must be able to give local anesthesia and assist the oculoplastics or strabismus cases in the corresponding rotations. Then, muscle surgery, trabeculectomies and glaucoma tube shunt placements, and extracapsular cataract extractions and their first phacoemulsification cases will be performed in PYG-3. The domestic training at the present is still in the apprenticeship model to some extent. The rising attention to the quality of care, patient safety, and deteriorated doctor–patient

relations threatens to relegate trainees to the role of passive observer. This situation may not be able to be improved without a mandatory requirement for the trained physicians and their supervisors to reach in residency program.

Secondly, the confusing division of responsibilities also reduce the training efficiency. The residents, and interns as well, are the bottom of the physician group in the hospital. Without the faculties such as physician assistants, nursing assistants, they are inevitably become the ones who take over those time-consuming paperworks, even the task of transporting patients. These can be very exhausting and killing the trainees' passion to the clinical works.

A final problem is the financing of medical education, to both the trainers and trainees. The new physicians feel that they work without being respected, because of the low salaries and hostility from patients. This causes the disappointment and aversion in the young Chinese doctors and medical students. Insufficient support to the teaching hospital also hinder teachers spending the time to observe, instruct, coach, and assess their students.

The strategies to meet the challenges in Chinese medical education system

The following are the strategies: firstly, among the many conditions needed in the reform of Chinese medical education, the "Top Design" is the most important one. With the rich resources of funds, medical staffs, and hospitals in China, the only thing we need to improve the quality of medical education and the efficiency of medical care is a more consummate system. In this system, the training tasks were detailedly assigned and regulated, the assessment criteria were strictly designed, the training plans were executable, and the trainees were reasonably paid. A better designed rule may help to balance the uneven distribution of medical training and medical care. Secondly, the system of medical education and training are also supposed to be Chinese characteristics. Under special social and historical circumstances in China, it is unreasonable to simply copy the US training system. Due to the huge population base, and the uneven quality of basic education and economic development, the selection, training and assessment of physicians must be different, in order to provide sufficient number of independent doctors not only the eastern developed area, but also the western undeveloped region. Finally, all those well-design training plan won't work without being effectively carried out. Design a detailed training to-do-list for physicians of each

department and strictly assess them according to the rules are essential. The Chinese medical students also deserve targeted, highly efficient, and strict training programs.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editors (Karl C. Golnik, Dan Liang and Danying Zheng) for the series "Medical Education for Ophthalmology Training" published in *Annals of Eye Science*. The article has undergone external peer review.

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/aes.2017.06.11>). The series "Medical Education for Ophthalmology Training" was commissioned by the editorial office without any funding or sponsorship. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/aes.2017.06.11

Cite this article as: Ge J, Luo Z, Yang S. Diversity and more investment needed in Chinese medical education. *Ann Eye Sci* 2017;2;34.