DOI 10.15302/J-SSCAE-2019.02.003

Development Status of Medical Talent Education Provided By Colleges and Universities and Discussion on the National Macro-Control Policy

Bai Huijun[1] , Feng Hao[1], Wang Caiyun[1], Fu Wenhua[1], Gao Baihong[1], Zhan Qimin[2]

1. Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing 100730, China
2. Peking University Health Science Center, Beijing 100191, China

Abstract: College-level medical education encompasses two livelihood projects of education and health as well as performs the important task of providing high-quality talents for medical and healthcare undertakings. Since people's demand for healthcare is continuously growing, the medical service model has undergone significant changes in China, and the development trend of the education provided by international medical colleges and universities necessitates higher-quality requirements for these medical colleges and universities in China. This study analyzes the development status of college education of medical and healthcare personnel in China, examines relevant problems, investigates a novel national college education framework for medical and healthcare talents by referring to advanced international medical education modes, and proposes relevant policy recommendations. Thus, this study provides new insights into the cultivation of excellent medical talents in China, protection of public health, and promotion of the development of the medical industry.
Keywords: college education; medical and health personnel training; policy suggestions

1 Introduction

Medical college education refers to the education of students enrolled in medical colleges. It is the first stage of medical and health talent training and an indispensable stage of fundamental medical knowledge acquisition in the complete process of medical talent training. Compared with the education provided in other academic disciplines, medical college education must place greater emphasis on the directness, practicality, and interactivity of teaching ideas, curricula contents, and teaching methodology. To build a healthy China, one of the major requirements is to develop a new type of college education model that is suited to the requirements of public healthcare and medical and health talent development. To protect public health, maintain social stability, and promote economic development, it is imperative that China build an excellent medical talent team with reasonable structural effectiveness, optimized distribution, adequate number of talents, and high-caliber talents. Based on the status of China's medical and health college education and the international experiences in medical and health talent training, this study analyzes the existing problems in medical college education and discusses how to establish a medical college education architecture that is suited to the development objectives of modern medical and health talents, requirements of medical reform, and requirements of socioeconomic development. Accordingly, the study intends to increase the vitality of medical colleges and develop medical and health talents with appropriate scale and caliber within a reasonable structural hierarchy.

Received date: January 15, 2019; **Revised date:** March 2, 2019
Corresponding author: Zhan Qimin, Professor from Peking University Health Science Center; Academician of Chinese Academy of Engineering. Major research fields include molecular oncology and translational medicine. E-mail: zhanqimin@bjmu.edu.cn
Funding program: CAE Advisory Project "Strategic Research on Medical and Health Talent Cultivation in China" (2016-ZD-11)
Chinese version: Strategic Study of CAE 2019, 21 (2): 069–073
Cited item: Bai Huijun et al. Development Status of Medical Talent Education Provided by Colleges and Universities and Discussion on the National Macro-Control Policy. *Strategic Study of CAE*, https://doi.org/10.15302/J-SSCAE-2019.02.003

2 Development status of China's medical college education

2.1 Law of growth of medical and health talents

The growth of medical talents follows an inherent law. To develop high-caliber medical talents, the medical teaching approach must follow this inherent law. Since the early 20th century, medical education has undergone continuous development and reform, and the development of medicine has undergone stages such as the science-based stage and problem-based stage to reach the current system-based stage. Further, the reform of medical education has undergone the science-based curriculum offering stage to the problem-based learning stage. The competence-oriented medical education system, which is gaining worldwide popularity, will inevitably become a milestone in contemporary medical education. Elite medical education requires competence to include the requirements pertaining to clinical medicine. The intent is to develop qualified doctors who are competent in clinical medicine and enhance the competitiveness of trained doctors.

2.2 Status quo of the enrolment source in China's medical college education

At present, China has 304 undergraduate medical colleges, (among which 177 offer courses in clinical medicine disciplines), with an annual enrollment of approximately 70 000 students. Further, China has a total of 368 junior medical colleges, among which 108 offer courses in clinical medical disciplines. Judging by the statistics on the applications to medical disciplines, there is a downtrend in many regions of China in terms of the relative ranks of enrolled candidates for undergraduate clinical medical disciplines among the total number of candidates enrolled in science courses, as well as the ranks of their highest scores in local regions. Most of the excellent or highly scoring candidates choose to study economics-related disciplines rather than medicine-related disciplines. Most of the enrolled medical college students are distributed in local medical colleges. In terms of the disciplinary structure, clinical medicine is dominant, and other medicine-related disciplines (e.g., biology, preclinical medicine, public health, pharmacy, and nursing) are rarely selected by candidates.

2.3 Status quo of the teaching approach followed in China's medical colleges

In China's medical colleges, the lecture-based teaching approach is dominantly followed. With the advance of the teaching reform in recent years, case-based and problem-oriented teaching approaches have started being widely used in Chinese colleges. Contrastingly, simulated training, which acts as the bridge between theoretical knowledge and practical skills, is not widely adopted, and the network-based teaching approach is seldom used. The standardized training of resident doctors provides an important guarantee for the homogenization of postgraduate medical education and forms an indispensable measure to ensure the quality of medical talents. To date, this model has successfully been implemented in a few pilot Chinese cities (e.g., Beijing, Shanghai, and Guangzhou). Based on overseas experiences that are relatively mature in terms of the standardized training of resident doctors and the country's socioeconomic conditions, China started implementing the standardized training of resident doctors on a large scale in 2014 and, subsequently, established a normative "5+3" clinician training system with Chinese characteristics, as well as implementing diverse training evaluation methods [1]. These steps indicate a key milestone in China's medical talent training.

2.4 Quality assurance system for China's medical college education

The quality assurance system of medical college education considers diverse factors (e.g., educational objectives, resources, operation, and management), is vital to ensuring the quality of medical talent development in colleges, and matches the orientations of medical colleges and the social demand for medical talent. Under the guidance of *The Views of the Ministry of Education on the Evaluation of Undergraduate Teaching*, China has established and constantly improved an undergraduate teaching evaluation system. Although the evaluation system has some problems, it facilitates the continuous update of teaching software and hardware in medical colleges, as well as the gradual tamping down of external and internal foundations. Talents play a key role in college education and form the vital force behind the educational quality assurance system. In China's medical colleges, the teaching structure is gradually optimized. The application of modern teaching methods (e.g., virtual technology and three-dimensional imaging) satisfactorily addresses many of the difficulties encountered in classroom teaching and enhances the learning interest of students, thereby realizing favorable external conditions for the educational quality assurance system [2].

DOI 10.15302/J-SSCAE-2019.02.003

3 Existing problems in the training of excellent medical talent

3.1 Status quo of enrolment quality in China's medical college education

Most of the enrolled medical college students do not study medicine out of personal interest and, hence, their commitment to the study of medicine is not steadfast. In general, the clinical disciplines offered by non-elite colleges do not attract high-quality candidates. Even after merging some medical colleges affiliated to the original Ministry of Health with comprehensive universities, their enrollment scale remains small and they offer courses in limited medical disciplines only. Despite having high educational quality, the medical students educated in these colleges only account for a low proportion. Clinical medicine is currently facing a shortage of general medical practitioners and pediatricians, which is negatively influencing the medical and healthcare efforts of the country. In terms of Comprehensive Health efforts, medical disciplines associated with the emerging health industry (e.g., health management, patient recovery, and biomedicine) have not formed a disciplinary system in the relevant colleges [3]. More than 75% of the pharmacy-related disciplines offered by Chinese colleges are not backed by medical disciplines. In addition, pharmacy education is currently confronting problems such as a shortage of student practice bases, an insufficiency of practical training time, and major differences between teaching and clinical medication. Therefore, it does not ensure patient safety and reasonable medication. Studies show that the enrolment quality is affected by the following main factors: increasing tensions in the doctor–patient relationship, long training duration of personnel in various medical disciplines, long growth duration of medical students, high employment pressure, and modest income [4].

3.2 Difficulties faced by China's medical college education

Today, the primary difficulties associated with medical teaching include the standardized training of medical and health talents and evaluation of the clinical competence of medical and health practitioners. The need for an accelerated update of medical information and changes in the social environment make the traditional teaching model (in which medical knowledge instruction plays an important role, students accept the instructed knowledge passively, and disciplinary integration is poor) outdated, and it cannot satisfy the current requirements of medical and health talent training. In addition, the practical teaching of clinical medicine involves problems such as the growth of tensions in the doctor–patient relationship and an increase in the self-protection awareness of patients and their family members. To provide clinical medicine students and novice physicians more onsite practice opportunities, it is necessary to develop a more scientific and humanistic teaching methodology. Further, the existing teaching contents are deficient in terms of developing students' international vision, ensuring interdisciplinary integration and resource integration, and intensifying the students' humanistic spirit and professional quality [5]. Related surveys reveal that postgraduate medical education is extremely inadequate in China, training quality varies from one training base to another, and some students can not acquire the appropriate professional ability or competence even after training.

3.3 Mismatch between the training provided to medical and health personnel and the status quo of human resources

China's hospitalization bases and medical training bases have an annual enrollment of 60 000–70 000 students, which is much lesser than the number of clinical medicine graduates. In addition, the average pass rate of China's medical practitioner examination has been approximately 60% for many years. The long training duration and rigorous elimination system further discourage students from enrolling in these bases. In addition, the training duration of clinical medical talents is very long, and the heavy input of resources and expenses contradicts the social pursuit of "low input but high output" [6]. Although large numbers of medical students graduate from colleges every year, public health institutions (particularly in rural grassroots areas and remote areas) suffer from a negative growth of medical talents. This indicates that most of the medical graduates fail to or do not work in public health institutions; most of them choose other professions. This study does not exclude the possibility that resigned employees outnumber novice employees in public health institutions since the available medical jobs are not sufficiently attractive to employees and offer only limited career development choices to medical talents [7].

3.4 Problems of the quality assurance system of medical college education in China

Studies show that the constituent parts of the quality assurance system of medical college education are scattered and even relatively isolated from each other, and the entire system is deficient in terms of scientific aspects, coordinateness, and completeness. For a long period, the development needs of Chinese medical colleges

at different levels and catering to different medical disciplines will not be completely satisfied and their enrollment orientation and school-running characteristics will not be completely manifested; further, a definite higher education management architecture is yet to be established to encompass national macro-control, college education, and social evaluation system aspects [8]. In addition, college accreditation and evaluation should be sound from the perspectives of complete process management, the participation of all students, and overall total quality management and strongly promote teaching quality. However, in some medical colleges, the subject on the consciousness of teaching quality and concept of an educational quality assurance system are outdated. Specifically, teaching quality evaluation emphasizes evaluation results but disregards evaluation processes and, in particular, evaluation results cannot receive timely feedback. These outdated concepts constitute a barrier to the construction of an educational quality assurance system in medical colleges.

4 Suggestions on the national macro-control policy

Based on the new requirements of the Healthy China strategy for medical talent training and new criteria [10] specified by the *Overall Program for Promoting the Construction of World-Class Colleges and World-Class Disciplines*, it is recommended that medical college education should be planned in the context of national medical and healthcare requirements and multiple regulatory authorities should take concerted actions in conjunction with medical associations to promote the coordinated growth of the scale, structure, quality, and efficiency of medical college education.

4.1 Promoting the reform of the talent training model by ensuring medicine–education cooperation and providing classified guidance

The reform of the model for medical and healthcare talent training in colleges should be enhanced using a medicine–education cooperation mechanism and ensuring the joint participation of multiple sectors.

(1) Based on the orientation of medical colleges at different levels, direct and control the scale of enrollment at the institutional and policy levels, improve the overall quality of medical graduates, and improve the quality of medical and health services by providing standardized training to resident doctors and providing training to medical talents who are urgently required in grassroots medical institutions.

(2) Gradually increase the academic education requirements of medical disciplines, strengthen the training of urgently required medical talents (e.g., general medical practitioners and pediatricians), and moderately increase the enrollment scale of nursing and medical technology disciplines.

(3) Increase the input to medical college education; build a special fund input mechanism for the standardized training of resident doctors; and enhance the comprehensive health service ability of clinical students by conducting medical consortiums, organizing medicine–education–research unions, and providing health service complexes.

4.2 Improving the quality of medical talent training through reform and innovation

Based on the new requirements of the Healthy China strategy for ensuring the quality of medical talent training, the following measures should be implemented:

(1) Strengthen the humanistic education and occupational quality training provided to clinical students, integrate medical fundamentals into clinical medicine’s curricula, and strengthen the clinical practice of clinical students.

(2) Strengthen the organic relationship between postgraduate education of medical students and standardized training of resident doctors, increase the passing rate of the medical practitioner (or assistant practitioner) examination, train physicians to become capable in both disease prevention and disease treatment, and strengthen their professional competence.

(3) Develop an innovative training model for excellent medical talents having a multidisciplinary background, and examine the optimal path for training eight-year clinical medical talents.

(4) Further examine the application-appraisal system for medical doctoral candidates and enhance the scientific research ability and research achievement transformation ability of postgraduate students in fields such as clinical medicine, preclinical medicine, pharmacy, and public health.

(5) Promote the application of artificial intelligence in medical talent training, optimize the medical talent training model, and improve the comprehensive quality of medical talents in the context of Internet plus healthcare.

DOI 10.15302/J-SSCAE-2019.02.003

4.3 Examining the path of training of high-caliber medical teachers to realize the objectives of constructing world-class colleges and world-class disciplines

The *Overall Program for Promoting the Construction of World-Class Colleges and World-Class Disciplines* resolves that medical college education should aim at the construction of world-class colleges and disciplines, promote international exchange and cooperation, enhance disciplinary construction, and deepen resource integration. In addition, medical college education should aim to develop innovative, application-oriented, and compound medical talents having an international vision, an interdisciplinary background, an innovative spirit, and significant practical ability. Today, the construction of world-class colleges and disciplines has become a national strategy. To develop high-caliber medical and health talents, the primary measure is to construct a first-class teaching staff. Hence, it is necessary to increase the training input, establish special training funds, form high-caliber and multidisciplinary teaching teams comprising teachers both within China and from other countries, and encourage teachers from multiple disciplines to jointly develop a medical curriculum system suited to the talent training objectives of the new era, thereby providing guaranteed curricula for medical talent training. In addition, it is necessary to highlight the importance of humanistic literacy and occupational competence in facilitating the training of excellent medical talents through the development of excellent teaching staff.

4.4 Innovating the entrance examination and appraisal system, and enrolling excellent candidates

Today, the overall employment environment for medical students remains underdeveloped. To attract excellent candidates in the short term, it is recommended to focus on the enrollment procedure and favorable enrollment conditions and explore methods such as early-batch enrollment and separate enrollment. Since physicians should possess a high emotional quotient and excellent communication skills, the existing reform in the college entrance examination based on comprehensive evaluation may incorporate clinical medicine, as well. Specifically, comprehensive evaluation has been implemented on a trial basis, and candidates' scores in the college admission examination and interview were included in the candidates' appraisal criteria. The intent is to matriculate excellent candidates for clinical medicine having disciplinary strong points, outstanding comprehensive quality, remarkable enthusiasm for medicine, and a hardworking spirit. In addition, candidates for medical disciplines may be granted special favors to prevent them from dropping the study of medicine in fear of the long educational duration and high costs of learning.

4.5 Strengthening the fund guarantee for medical education, and enhancing the attractiveness of medical jobs

There are recommendations to strengthen the fund guarantee for medical education, establish a dynamic fund growth mechanism, increase the fund allotment per medical college student and subsidy standard for postgraduate medical education, increase the fund input of continuing medical education, and provide special support for education in clinical medicine disciplines and the training of urgently required medical talents (e.g., general medical practitioners and pediatricians). Further, it is necessary to strengthen the construction of pharmaceutical education and training bases and moderately increase the tuition standard for medical disciplines. It is noted that medical and healthcare talents are highly educated at a high cost and their work is highly technical and involves intense labor and severe risks. Therefore, institutional guarantee should be provided to them to earn a decent income. To increase the attractiveness of medical jobs, preferential policies should be implemented to improve the remuneration provided to urgently required medical talents.

4.6 Promoting the management system reform of medical colleges in comprehensive universities

It is recommended that a supervision system be established and the management system reform of medical college education be enhanced. It is necessary to establish comprehensive universities that provide medical education according to the law of medical education; enhance the management system reform of medical education; ensure the systematic nature, integrity, and relative independence of medical education; and build and optimize a management architecture for medical colleges and institutes. In addition, medical colleges, institutes, or centers should be granted relative autonomy; their internal governance structure be gradually optimized; and the organic connection between the constituent elements of medical education be consolidated and strengthened. Moreover, it is necessary to reasonably address the relationship between comprehensive universities and medical colleges and that between medical colleges and their affiliated hospitals; enable full play to the role of medical colleges, institutes, or centers of comprehensive universities; ensure the service function of affiliated hospitals for medical education; and stimulate the medical personnel of affiliated hospitals to play an appropriate role in

classroom and clinical teaching. Therefore, the ultimate aim is to promote medical education and research and continuously improve the quality and level of provision of medical services through mutual promotion and common development of related disciplines.

In summary, medical colleges should review the entire process of providing college education to outstanding medical talents according to the new requirements set by the Healthy China strategy, take targeted reformative action to resolve the problems encountered at different stages, and strengthen institutional development and mechanism innovation. Medical college education should be oriented toward the demands of the medicine and health sector, focus on the training of general medical practitioners and urgently required medical talents, aim to develop innovative and compound medical talents, and establish a connotative development model that is centered on the quality of talent training. Moreover, it is necessary to strengthen the cooperation between medicine and education, reform the methods of medical talent training, perfect the medical talent training system, optimize the relevant disciplinary structure, and enhance the quality of medical talent training.

References

[1] Li Y X, Lv L X, Shao Z H, et al. Construction and practice of the cultivation system of top-notch innovative medical talents by collaboration of medical practice, education and research [J]. Chinese Journal of Medical Education, 2018, 38(3): 321–324, 329. Chinese.

[2] Qu W, Liu X Z, Zhang T. Prospects for the development of education quality assurance system in higher medical colleges [J]. Chinese Journal of Medical Education, 2018, 38(5): 647–650. Chinese.

[3] He K, Wang L. Deepening reform of medical education, training excellent medical talent [J]. Chinese Journal of Medical Education, 2015, 35(1): 31–32. Chinese.

[4] Bao J B, Wang L. To innovate “integrated” medical talents teaching model for healthy China construction [J]. Chinese Journal of Medical Education, 2016, 36(6): 817–820. Chinese.

[5] Li Y J. The realistic difficulties and path constructed of law-related education on medical students [J]. Soft Science of Health, 2018, 32(12): 66–69. Chinese.

[6] Xiao P, Xiao H P, Xian L Q, et al. Depending on a comprehensive university, series of lectures on arts and medicine had been held to promote the medical students’ humanistic quality [J]. Medicine Teaching in University(Electronic Edition), 2013, 3(3): 52–56. Chinese.

[7] Guo K H, Li M F, Wu M H. Medical education reform and practice under the background of holistic integrated medicine [J]. Chinese Journal of Medical Education Research, 2018, 17(2): 113–116. Chinese.

[8] Li C L, Cai X, Deng Y F, et al. Undergraduate medical education in developed countries and regions, and the enlight-enment for Chinese medical education [J]. Chinese Journal of Social Medicine, 2015 (6): 440–442. Chinese.

[9] Zhang S H, Qin Y T, Huang J J, et al. Research on the situation and strategy of integrated medical education reform in universities and colleges [J]. Chinese Journal of Medical Education Research, 2018, 17(11): 1091–1095. Chinese.

[10] Liu N. The construction of teacher education teaching ability standards in medical colleges in China—Based on the essential qualities of students [J]. China Higher Medical Education, 2018 (9): 35–36. Chinese.