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On a Balancing Mechanism between Supply of Medical Education and Demand for Medical Personnel in China

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Abstract: The imbalance between supply and demand in terms of the talent cultivation scale, structure, and quality is one of the key issues facing the development of medical personnel in China. The supply of medical personnel in China cannot meet the growing demand for health. In addition, the quality of personnel training is uneven and the personnel supply structure does not match social needs. Through research and a discussion on the forms and content of medical education in the United States and the United Kingdom, this paper proposes ways to maintain a balance between the supply of and demand for medical education in China and improve the efficiency of medical training. We recommend a gradual establishment of a balanced personnel supply and demand mechanism, where the number and structure of postgraduate training posts determine the enrollment size and structure of medical colleges and universities and the establishment of a dynamic monitoring and early warning mechanism for ascertaining the demand for medical personnel. Furthermore, medical personnel training requires cross-departmental macro-coordination and regulation, and quality standards such as a high threshold for doctors should be set to limit the cultivation scale of clinicians.

Keywords: medical education; clinical training; supply-demand balancing mechanism; policy implications

1 Introduction

Since China launched the reform and opening-up policy forty years ago, the development of medical education in China has made remarkable progress. However, medical education still faces some challenges that need to be addressed urgently. The scale of medical education directly affects the supply and storage of national health personnel. Considering the trend of increasing emphasis on university autonomy in the higher education sector, the major setting and enrollment need to be effectively matched with the industry. The imbalance between the supply and demand of the scale, structure, and quality of personnel training is one of the key issues hindering the cultivation of medical and health personnel in China. The number of skilled professionals needs to be scientifically planned, and the quality of education needs to be improved further. Medical needs require regional and professional co-ordination, and the mechanism for balancing the supply and demand of skilled professionals needs to be established urgently.

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2 The current situation and problems of supply and demand of medical and health personnel in China

2.1 The number of personnel supply cannot meet the growing demand for health

In the past ten years, the medical and health needs of the Chinese population have increased rapidly. The average number of visits to hospitals per person increased from 3.1 in 2005 to 5.6 in 2015. The number of hospital patients increased from 1.387 billion in 2005 to 3.084 billion in 2015. The resident annual hospitalization rate increased from 5.5% in 2005 to 15.3% in 2015. The average daily workload of doctors in general hospitals has also increased markedly. The daily average number of medical treatments increased from 5.3 in 2005 to 7.8 in 2015. The number of utilized hospital beds increased from 1.6 beds per day in 2005 to 2.6 beds per day in 2015 [1]. With the development of the social economy and the deepening of medical-sanitary system reforms, people's demand for medical and health services has increased. The medical and health industry is heavily burdened with the task of providing quality medical services, and medical education is needed urgently to provide medical personnels.

Compared with developed countries, there is still a gap in the allocation of human resources per capita in China's health sector. The number of doctors, nurses, and hospital beds per one thousand in China is relatively low among the Organization for Economic Co-operation and Development (OECD) countries, and the number of practicing doctors per one thousand is only about half the level of developed countries and regions. The supply of medical personnel presents the situation of "hypocritical oversupply" in big cities and "insufficiency in grassroots and remote areas". Judging from the current total demand for clinical medical graduates, the scale of existing medical education is slightly larger than the demand. From the perspective of the supply of standardized training bases for resident doctors, the supply is slightly smaller than the demand [2,3]. There is generally a shortage of high-level medical personnel with international competitiveness in China. The medical science and technology personnel have insufficient innovation ability. There is a relative shortage of public health personnel and personnel specializing in traditional Chinese medicine.

2.2 The quality of personnel training varies

The quality of medical education directly affects the health quality of the whole nation. At present, in spite that the scale of medical education and the amount of training in China have increased significantly, medical institutions are still facing a shortage of personnel, which indicates an overall discrepancy between supply and demand. China's higher education management system implements the hierarchical management of the central government and local governments, resulting in a generally smaller enrollment size for colleges with a large number of high-quality resources. However, most medical colleges and universities are continuously increasing the training scale. Some newly established medical colleges and higher vocational schools have entered the medical education system, which has led to a decline in the efficiency and quality of medical personnel training [4]. In 1999, China implemented the policy of enrollment expansion in higher education, and the problems arising from the policy have been highlighted. Some local colleges and universities enroll thousands of students every year through special enrollment (with a relatively low cut-off score), which makes it difficult to ensure quality teaching and quality graduates. In order to achieve high numbers of enrollment and training, some regions blindly reduce the barriers to the admission of medical students, without paying attention to the training quality, thus fundamentally changing the elitism required for medical and health personnel. Strict quality control and admission systems are required for the training of medical students at various stages. At present, an ideal management system does not exist, and the quality of medical institutions and the medical safety of patients cannot be guaranteed. The quality of medical personnel training cannot be guaranteed by scientific homogenization. In the process of training, medical colleges and universities are slow to respond to external demands; they lack vitality; the training mode of curriculum system is solidified; the medical education reform oriented by post competency promotion is slow; and the corresponding education quality evaluation standard and guarantee system are not ideal, and cannot meet the social demands.

2.3 The personnel supply structure does not match the social demand

The training structure of medical and health personnel in China does not completely match the social needs. The analysis of the demand for national health personnel is not coordinated, and the quality, structure, and distribution of health personnel are not satisfactory. Currently, there is a lack of regional and professional co-ordination in the specialty and quantity of health personnel training in China, which leads to problems in personnel distribution. For

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example, high-level medical and health personnel cannot get employed in some areas, while some other areas need high-level personnel but cannot recruit any. Some colleges do not offer general or nursing majors. The training of public health, pediatrics, mental health, and pathology personnel cannot meet the demand. In 2015, the number of general practitioners in China was only 188 000, accounting for 6.2% of the total number of practicing (assistant) physicians, of whom 120 000 had obtained the general practitioner training certificate; however, this proportion is at least one third in OECD countries or even 50% in some OECD countries. The ratio of general practitioners to specialists is seriously unbalanced, and China's goal of 2–3 general practitioners per 10 000 people should be realized by 2020. The task is still extremely difficult [5].

The shortage of personnel is a serious bottleneck restricting the development of primary health care in the central and western regions, especially in poverty-stricken areas. Among them, personnel in pediatrics and psychiatry are even scarcer. There is a huge gap between urban and rural areas in the distribution of personnel. Medical graduates have listed tertiary hospitals in large- and medium-sized cities as their main job-hunting targets, and the number of people employed in grass-root communities and villages is relatively small, resulting in a shortage of primary medical personnel in China. Although it is practically difficult for clinical junior college education to satisfy the medical needs, three years of junior college education, and two years of assistant general practitioner training will still exist for a long time due to local conditions and the school system.

3 International experience

3.1 The case of the United States

The United States attaches high importance to guiding the balanced supply of personnel through labor policies. In the past 20 years, the US physician labor force policy has warned in advance about the shortage or surplus of physicians in different periods. A prediction study published by the Association of American Medical Colleges in 2017 revealed that the United States will face a shortage of 40 800 to 104 900 doctors by 2030 [6]. Solving the shortage of doctors requires a multi-pronged approach. One of the main measures is to call for the lifting of the ceiling on the number of federally funded resident training posts in order to achieve the goal of adding at least 3 000 more doctors each year.

Medical training in the United States is an elite and homogeneous education, and the number of resident doctors determines the number of medical admissions. The review committees constrain the number of medical students trained to the number of resident training positions. Around April each year, the Accreditation Council for Medical Education publishes a residency training program to provide post-graduate training positions to graduates of medical schools across the United States and abroad. The plan details the residency program required for 28 specialists (including subspecialties) and the number of residents currently being trained. American medical students have to complete the training of resident doctors before they can practice medicine. Medical school is expensive; and lack of training posts for resident doctors after medical school will have a detrimental effect on individuals and medical schools; therefore, medical schools will not rush to expand enrollment. Overall, the total number of residency training positions is a major factor in limiting medical school enrollment.

In view of the contradiction between supply and demand in the training of doctors, the United States attaches high importance to the prediction of the supply and demand of doctors, which has an impact on the training scale of medical colleges and universities through the national resident matching system. The matching of US resident and training base is done by the National Resident Matching Program (NRMP), a non-profit, non-governmental organization funded by the American College of Physicians, the American Medical Association, the Association of American Medical Colleges, and the American Hospital Association. The role of the organization is to promote a reasonable match between medical students and residency training programs. Effective and stable matching can balance the supply of and demand for medical personnel, improve efficiency, and prevent the waste of educational resources. It explores ways to address the discrepancy between the supply and demand of medical personnel, strictly monitors the institutions that offer medical education, and promotes the smooth and healthy development of medical education by adjusting the layout of education, rationally planning the enrollment size, and strengthening the construction of teachers and disciplines.

3.2 The case of the United Kingdom

The "5+2+3" model is generally adopted in the training of general practitioners in the UK, and the training duration is up to ten years; this is to ensure the service capability of general practitioners. In 2012, the Health and Education National Strategic Exchange (HENSE) released its report on the *Review of Medical and Dental School*

Intakes in England to investigate whether the current number of medical and dental students meets future workforce needs, as well as make recommendations for future enrollments.

The medical schools of British universities have their own positions. The training methods are strict and there are opportunities for adjustment. Medical colleges of various universities use the number of students who receive the average student grant as a means to control the enrollment size. High school graduates apply to the medical school through the University and College Admissions Service (UCAS) center, and each medical school conducts independent selection based on the students' grades, letters of recommendation, academic intentions, and interview performance. The British General Medical Council (GMC) is responsible for setting out medical education and assessment standards, specifying unified requirements for medical colleges and teaching hospitals across the UK. The GMC and its subordinate departments assign experts to assess 33 medical colleges and universities across the UK every four years to ensure high-quality education in medicine [6].

4 Countermeasures and suggestions

4.1 The gradual establishment of a balanced personnel supply and demand mechanism where post-graduation training positions determine college education

According to *Guiding Opinions on Establishing a Standardized Training System for Residents*, by 2020, a standardized training system for resident physicians should be established nationwide, and all clinicians from the undergraduate level and above, in new medical positions, will receive standardized training for resident doctors. It is suggested that, on the basis of society's needs, the number of positions offered by the standardized training bases for resident doctors in the whole country and various regions should be calculated in advance, through scientific planning in professional fields, in order to determine the number of medical students in various professional fields. At the same time, the residency training position plan needs to be implemented in specific specialties. By setting up training positions where different professional residents, the number of skilled professionals in the corresponding majors can be adjusted. In the future, we will gradually establish and perfect the supply and demand balance mechanism for the number of undergraduate/master/doctoral students is determined by the number and structure of residential/general/specialized training positions.

4.2 Establishment of a medical and health personnel demand dynamic monitoring and early warning mechanism

The training period for medical and health personnel is long, and there is a lag in the training of medical and health personnel compared to the urgent demand for medical personnel. It is suggested that through systematic planning and a top-level design, medical and health personnel training in various professional fields should be planned ahead of time, and medical education should be deployed and adjusted in advance. This should be done through the establishment of a medical and health personnel demand dynamic monitoring and early warning mechanism, to ensure the quality of medical education and sustainable development. This involves establishing and refining the hierarchical and stratified medical and health talent survey network, effectively utilizing big data resources of health, comprehensively analyzing and dynamically monitoring the status of medical and health personnel in different regions and at different levels, and the demand structure of medical professionals in various professional disciplines in various regions. It is recommended to strengthen the departmental coordination mechanism to ensure data collection and sharing. It is also suggested that government departments should pay attention to the scientific formulation of a medical education policy and its operability, regularly publish information on medical and health talent demand forecasting, and guide the professional setting of colleges and universities and the adjustment of the enrollment size.

4.3 Medical personnel training requires cross-sectoral macro-planning and regulation

Medical education is an important part of the national health cause, which needs to be regulated by powerful departments through administrative management and legislation. Whether it is a government agency or an industry association, the regulation of medical education requires a department that has a strong voice in medical education, and an institution that has strong control over the health service system. Medical education and the medical system are not separated. For example, the NHS in the UK has promoted the general practitioner referral system, which in turn promotes the market demand of general practitioners, thus promoting the market demand of general practitioners. In addition, the market demand determines the training plan of medical students. The regulation of

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the medical system affects the demand of the market, and the demand of the market regulates the scale of medical education.

4.4 Limit the training amount by adopting stringent admission and graduation policies in medical schools, a high threshold for doctors' professional access, and other quality requirements

Setting a high threshold for the professional access of doctors is a typical training mode for medical personnel in the US and UK, which cultivates high-quality doctors and limits their number. The specialized committees will not lower their standards. The old-fashioned medical colleges cherish their historical legacies and reputation and will not easily expand enrollment. Therefore, their high expertise is assured, the social status of these doctors has increased and they have won the trust of patients. There is a strict limit on the number of students enrolled in each medical school in the UK. The average student grant is only for medical students who meet the criteria set by the admission policies and plans. The grant is used to limit the enrollment size and quality of medical students. The training of medical students requires cross-departmental macro-coordination and regulation. The balance between supply and demand of doctors needs to fully consider the investment of funds and the characteristics of doctors' employment. After graduating, the medical students who are educated as "socially conscientious individuals" are connected to the resident doctors' training bases, and the number of trainings is limited by the quality requirements of the medical school's "stringent admission and graduation" policy and the stringent criteria for doctors' access. The entry threshold for doctors should be based on scientific planning under national conditions; it should control the scale and improve quality, adopt a strategy of combining post-salary system incentives with talent cultivation, and gradually develop in stages.

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