

# Development Strategy for Cultivation of Forensic Medicine Talent in China

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**Abstract:** This paper examines the existing forensic medicine education in China and abroad, analyzes the challenges faced in forensic talent training in China, and proposes policy recommendations for promoting the development of forensic medicine education. To this end, we propose the following measures: establish a forensic medicine first-level discipline to promote the overall strength of forensic medical science; establish an eight-year training system for forensic medicine to innovate the forensic medicine talent training mode; establish a professional degree for forensic medical postgraduates to meet the demand for high-quality applied talent; establish a continuous education system to ensure the competence and professional levels of forensic experts; and provide forensic courses for clinical medical students to enhance their forensic awareness.

**Keywords:** forensic medicine; medical education; talent cultivation; development strategy

## 1 Introduction

Forensic medicine is a medical discipline that involves the study and solving of medical problems related to law: for example, cases related to personal injury, death, or person identification, providing clues for criminal investigation, and providing evidence for trial. The development of forensic medicine is linked to the national economy, as well as to people's livelihoods and social stability in China. Moreover, it plays an irreplaceable role in the comprehensive promotion of the rule of law. Forensic medicine has played an important supporting role in the handling of 69 types of criminal, civil, and administrative cases, as well as in those involving natural disasters, terrorism, and human-made disasters. Among the criminal, civil, and administrative cases concluded by the national court system between 2013 and 2017, there were 2 360 200 cases that involved forensic medicine. In recent years, forensic medicine has provided critical technical support in the handling of cases that had a significant impact, both at home and abroad. For example, the "Eastern Star" shipwreck case, identification of the victims of the Tianjin Port bombings, and the "Serial killings in Baiyin" case have all been supported by forensic DNA technology. Similarly, the "death of Lei Yang in Beijing," "Lin Senhao poisoning in Fudan," and the "death of Li Wangyang in Shaoyang" cases were also based on the forensic identification of the cause, mechanism, and mode of death, as well as the injury mechanism. Forensic medicine has played an increasingly important role in comprehensively promoting the rule of law, scientifically handling complex incidents, cracking down on criminal offences, and building a peaceful and beautiful China.

The significant role of forensic medicine has attracted widespread attention in countries worldwide [1–3]. Several countries have increased their support for forensic research and practice [4,5]. The utilization of forensic medicine has become an important means for promoting social governance, implementing law, and maintaining

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social security and stability in developed countries. The United States, Germany, the United Kingdom, France, Japan, Portugal, and Spain have advanced forensic medicine training systems with an “expert-type” training model. For example, to become a forensic pathologist, an individual must have not only postgraduate university education but must also undergo practical training in pathology and forensic pathology for several years. Because forensic medicine involves identifying, judging, and providing scientific evidence on forensic issues in lawsuits, forensic medicine professionals must master the relevant theory and technology, have practical experience in identification, and must independently solve the practical problems of identification. [6].

## **2 Establishment and development of forensic medicine education with Chinese characteristics**

### **2.1 Historical changes in the talent cultivation for forensic medicine**

The world’s first recognized forensic masterpiece, the *Hsi Yuan Lu*, was written by Song Ci over a thousand years ago. After that, forensic medicine in China was in backward stagnation for hundreds of years until the 1930s, when Professor Lin Ji began a forensic medicine course at the School of Medicine in Peking University and became a pioneer in spearheading the country’s attempts to be on par with global advancements in forensic medicine. After the founding of the People’s Republic of China, the Party and the state attached great importance to the development of forensic medicine. In 1951 and 1954, two courses on senior teacher training for forensic medicine were successfully conducted, which laid the foundation for education in forensic medicine at medical colleges and research institutions. In 1979, the first undergraduate students of forensic medicine in China enrolled at China Medical University, Sun Yat-sen Medical University, and West China University of Medical Science. A seminar on professional education in forensic medicine—the Jinci Conference—was jointly organized by the Ministry of Education, the Ministry of Health, the Ministry of Public Security, the Ministry of Justice, the Supreme People’s Procuratorate, and the Supreme People’s Court in 1983 at Jinci in Shanxi Province. In the meeting, it was proposed that the professional education in forensic medicine in China be based on the real situation in China, take its own path, and strive to adapt to the needs of socialist modernization, especially the implementation of the legal system; moreover, a socialist education of forensic medicine with Chinese characteristics should be established. The Jinci Conference was a milestone for forensic medicine education, and provided a training model of forensic medicine at medical colleges [7].

### **2.2 Formation and development of forensic medicine education**

#### **2.2.1 The status quo of undergraduate professional training in forensic medicine**

After 40 years of healthy, rapid, and comprehensive development, the cultivation of forensic medicine talent in China has begun taking shape. Presently, there are over 30 colleges and universities in China that offer undergraduate programs in forensic medicine. These schools are located in seven regions of China: Northeast China, North China, Central China, East China, South China, Northwest China, and Southwest China. This indicates an optimal layout of educational institutions offering forensic medicine education. Each school provides the national standard quality of undergraduate forensic medicine education. In terms of general education, the professional education in forensic medicine includes forensic pathology, forensic genetics, forensic clinical medicine, forensic toxicology, forensic toxicology analysis, forensic psychiatry, and other sub-disciplines. The professional talent cultivated through forensic medicine education in China meets the requirements of major forensic casework.

#### **2.2.2 Establishment of a multi-level forensic professional training system**

Graduate studies in forensic medicine have been developed based on the foundation of undergraduate courses. The increase in the number of MD and master’s degree programs in forensic medicine has transformed the talent pool. Simultaneously, training and further education in forensics has also developed. Forensic medicine education in China is offered at both undergraduate and postgraduate levels, as well as through forensic medicine courses for medical students, among other programs.

## **3 Challenges in the cultivation of forensic medicine talent in China**

### **3.1 The contradiction between the structure of talent cultivation in forensic medicine and the demand for the rule of law in the modern era**

China has pioneered the training model of forensic medicine in medical colleges, and solved the problem of insufficient number of experts in forensic medicine. However, China has not yet established a strict professional qualification certification system, and needs to improve its post-graduate education and training system, especially the “expert type” training model. China’s law stipulates that forensic identification includes forensic pathology, forensic biological evidence, forensic clinical medicine, forensic toxicant analysis, and forensic psychiatric identification, which means that the rule of law construction in the modern era requires numerous experts in forensic medicine fields.

The present five-year undergraduate program in forensic medicine involves short professional study time, less practical experience, and a lack of technical ability; thus, after graduation, graduates are unable to meet the requirements of forensic practice. Such a training mode and the current situation are unable to meet the demand for experts in the rule of law [8]. Therefore, there is an urgent need to optimize the structure of talent cultivation, increase the proportion of applications and technical skills, and reform and innovate the training model for experts in forensic medicine.

As shown in Fig. 1, the number of graduates in forensic medicine has been too small each year; and graduate education is an important stage in cultivating “expert-type” talents. With the acceleration of the rule of law construction, the demand for high-level experts in forensic medicine has significantly increased. The current gap between talent quality and demand is enormous. The professional talent at the graduate level of forensic medicine is far from being the main component of the forensic medical team. The contradiction between the cultivation structure of forensic professionals and the demand for rule of law construction in the modern era is considerably prominent and must be resolved.

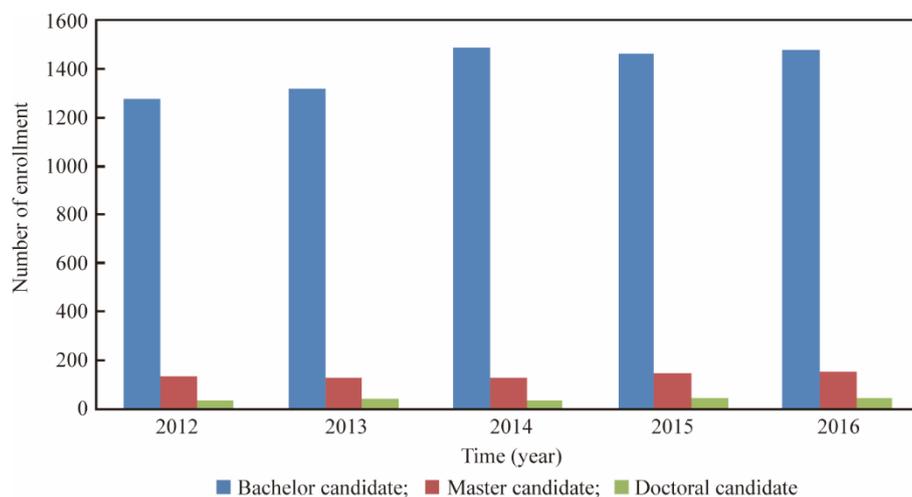


Fig. 1. Number of enrollment for forensic medicine in universities in China for 5 years.

### 3.2 Forensic medical research in China is continuously advancing, but there is still a large gap compared to developed countries.

There have been new breakthroughs in the scientific research on and innovation capabilities of forensic medicine in China, which have been at par with international standards in some cases. However, the overall technical ability and level is unable to meet the needs of fair justice, and there is still a large imbalance compared to developed countries [9]. It is necessary for China to achieve major breakthroughs in the field of forensic science and technology through advanced scientific research. Moreover, it is necessary to strengthen the cultivation of talent—especially senior-level experts—to create “high-end” academic talents.

### 3.3 Forensic medicine is neglected in clinical medical education, which is not conducive to the cultivation of clinicians

As an important part of medical education, forensic medicine education is undergoing an inevitable development trend. However, at present, only a fifth of the medical colleges and universities in China provide courses in forensic medicine, while several clinical medical graduates lack the knowledge of forensic medicine. This is in stark contrast to the forensic medical credits of doctors’ licenses in developed countries. Clinical medical

graduates or practitioners in China lack legal knowledge and an understanding of the legal responsibilities and potential practice risks of physicians. Thus, they are unable to solve the legal problems faced in practice and lack the ability to solve medical disputes through legal means [10].

## **4 Recommendations for the development of forensic medicine education**

### **4.1 To establish the first-level discipline of forensic medicine to promote the overall strength of forensic medical science**

Forensic medicine is a comprehensive medical discipline with its own independent theory and specialized technical systems. It comprises a knowledge system based on science, validation, and forensic practice. The system has been developed from the theories and techniques of basic medicine, clinical medicine, biology, and other related natural sciences, covers the relationships between the structure and function of biological molecules, and dynamic and static structures, including the time-dependent changes of biological macromolecules. It also involves theories and technologies of forensic sciences and translational medicine. China is the birthplace of forensic medicine. Forensic medicine includes forensic pathology, forensic genetics, forensic toxicology, forensic clinical medicine, forensic psychiatry, forensic anthropology, forensic entomology, and forensic imaging, along with several other branches. A first-level discipline of forensic medicine must be established. Since the early 1980s, a bachelor's degree in forensic medicine has been established in the medical undergraduate education system in China. China's achievements in forensic medical research and postgraduate training in the past 40 years prove that it is time to establish the first-level discipline of forensic medicine that is conducive to the field's rapid and sustainable development. This will benefit the integration of undergraduate and postgraduate education, as well as the cultivation of highly skilled talent and enhancing its overall strength and international competitiveness.

### **4.2 To establish an eight-year training system for forensic medicine to innovate the talent training mode**

Professional training in forensic medicine should be strengthened according to the national standards of undergraduate education. The undergraduate programs in forensic medicine should be improved using a "three teachings and one training system," which includes general education, practical education, scientific research, and high-end talent cultivation. Based on the five-year talent training model, it is suggested that a consistent eight-year training system for MD degree students of forensic medicine be established in some universities with better conditions. The courses in the eight-year consistent program must include basic courses (General Education Course and Medical Foundation Course), along with courses in clinical and forensic medicine, forensic medicine and sub-discipline internships, and scientific research training. Such a program will benefit the creation of high-quality, comprehensive, top-notch talent in forensic medicine.

### **4.3 To set a professional degree for forensic medical postgraduates to meet the need for high-quality applied talent**

Forensic medicine is a practical discipline. A professional degree for forensic medical postgraduates should be introduced, which includes master's and doctoral degrees. The scale of a professional degree for forensic medical postgraduates should also be increased to meet the requirements of the rule of law.

### **4.4 To establish a continuous education system to ensure the competence and professional level of forensic experts**

Advanced forensic training centers should be established for the integration of forensic practice and education. Additionally, competency and certification training for forensic practice should be provided. It is emphasized that the continuous improvement in competence should be based on high-level continuous education and training, as well as on its standardized evaluation as the scientific basis for practicing qualification management to ensure forensic experts are professionally qualified.

### **4.5 To provide forensic courses for clinical medical students to enhance their forensic awareness.**

A forensic course should be provided for clinical medical students to enhance clinicians' legal and medical evidence awareness. This would effectively protect clinicians' medical rights, prevent and reduce the occurrence of medical disputes, and enhance the duties of medical staff. Credits in a forensic course should be one of the basic conditions required to obtain a doctor's license.

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