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Analysis of the Curriculum System of Five-Year Clinical Medicine in 12 Universities of China

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Abstract: Objective: To study the curriculum system characteristics of the five-year undergraduate clinical medicine in 12 of the pilot universities of "the Excellent Doctor Education and Training Plan". Methods: Content analysis is conducted to analyze the curriculum systems (five-year) of clinical medicine specialty, from 12 institutions that undertake the reform project of five-year clinical medicine talent training project. Results: The curriculum structures tend to be rigid; The distribution of credit proportion is usually unreasonable; The course opening times are staged; Courses for professions mainly cover disease-related courses. Conclusion: It is suggested to break the traditional structure and build a modular curriculum system; Set the primary role of humanistic education in medical study; Improve students' learning efficiency by integrating and optimizing the courses for professions; Make dual focuses for both compulsory and optional courses and construct the Medical+X curriculum system.

Keywords: Five-year clinical medicine; Curriculum system; Excellent doctors; New medical science

In April 2019, the Ministry of Education promulgated the "Six Excellence and One Top-notch" plan 2.0, further emphasizing the needs to improve the quality of China's higher medical education. It suggests building a new system for future medical education by constructing "New Medical Science", and cultivating a group of talents who are able to integrate the medical knowledge and advanced technologies from other related domains from an interdisciplinary perspective. Furthermore, they are expected to be equipped with a comprehensive health management awareness and humanistic qualities[1]. The curriculum system is the basic unit of the talent training system and the core link of the teaching plan [2]. Students' knowledge acquirement and logical thinking system will be directly affected by the qualities of the courses. By analyzing the status quo of the current five-year curriculum system of clinical medicine majors in 12 domestic higher education institutions, this article objectively summarizes the problems existing in the design of the curriculum system in various universities in China, to contribute reasonable suggestions for adapting to new concepts and requirements of the medical reform, as well as improving the quality of medical talent cultivation.

1. Data and Methods

In this study, 12 institutions were selected as the research objects, covering the east, south, west, north, and central regions of Chinese mainland. Content analysis is conducted to analyze the status quo of the systems and summarize the existing problems.

Table1 the Institution List

Attributes	(the 5th) Subject Evaluation	Institution	Data Year	Data Source
Comprehensive Universities	A+	Shanghai Jiaotong University	2022	Official Website
	A+	Zhejiang University	2019	Official Website
	A-	Huazhong University of Science and Technology	2020	Official Website
	A-	Sichuan University	2018	Official Website
	B	Wuhan University	2018	Official Website
	C-	Shihezi University	2019	Official Website

Medical Colleges	B+	China Medical University	2017	Official Website
	B+	Chongqing Medical University	2016	Alumni Consultation
	B	Tianjin Medical University	2019	Official Website
	B-	Wenzhou Medical University	2016	Official Website
	B-	Guangzhou Medical University	2015	Official Website
	C-	Southwest Medical University	2021	Alumni Consultation

2. Results

2.1 Curriculum structures are rigidly designed

The current curriculum systems of the 12 colleges and universities are basically designed according to the "National Standards for Undergraduate Professional Teaching Quality (Clinical Medicine)" and "China Undergraduate Medical Education Standards-Clinical Medicine (2016 Edition)". Courses are divided into 8 categories horizontally, which 1) General Education, 2) Natural Sciences, 3) Public Health, 4) Humanities and Social Sciences, 5) Basic Medicine, 6) Clinical Medicine, 7) Other Optional courses, 8) Practical Workshops. From this, the course structure tends to be rigidly fixed.

2.2 Credits are unreasonably allocated

The credit structure of the course groups of the 12 colleges and universities is roughly the same. Sorting out from the highest of the credit proportion, the course names are respectively Clinical Medicine, Biomedicine, Internship, General Education, Optional Courses, Natural Sciences, Public Health, Humanities and Social Sciences. Meanwhile, the highest credit requirement for graduation reaches 284.5 points, while the lowest was 208 points, with the median of 241.75 points (Figure 1). Amongst the courses, Clinical Medicine, Biomedicine, and Internship are the core modules for medical students, which take more than 60% of the credits. However, Humanities and Social Science courses account for only 2% of the total credits, while these courses usually are the main approaches to cultivate students' professional ethics, humanistic care, and social culture; Natural Science account for 6% of the total credits with the role of laying the foundation for medical students to learn medical science.

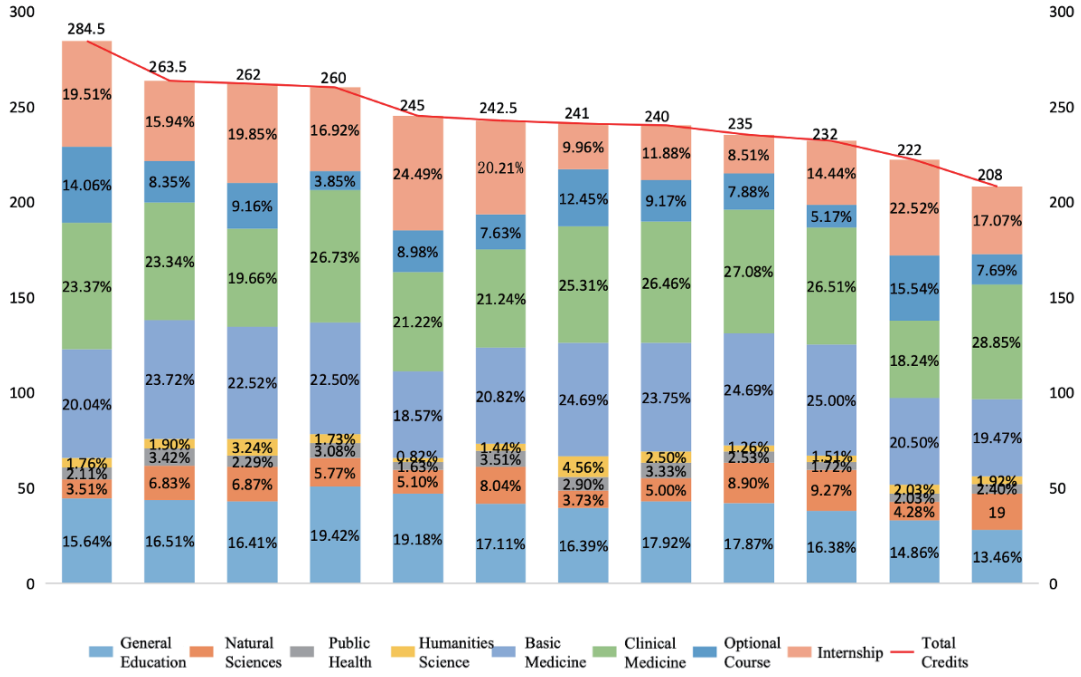

Figure 1 The credit composition of course groups in colleges and universities

2.3 Course opening times are staged

Currently, there are some problems in the division of courses in most colleges and universities: if general education, humanities and social science courses are only arranged in the first three academic years of the university, it will not be able to achieve comprehensive quality and long-term medical humanities education, resulting in medical humanities The effect of education is not strong, and it lacks the combination with medical practice [3]; while the practical courses are arranged in the later stage, it will be difficult for students to combine theory and practice well during the learning process, and the practical teaching of two semesters is relatively inefficient compared with theoretical teaching. Meanwhile, the start time of optional courses is relatively fixed, resulting in the difficulty

to synchronize the course content with the progress of compulsory professional courses, as well as meeting the needs and goals of students' course selection [4].

2.4 Professional courses are mainly disease-centered

Currently, most of the core courses of clinical medicine majors in China are following the traditional curriculum model of being "disease-centered". To supplement traditional courses, 6 universities offer biomedical integration courses, and 4 universities offer system integration courses in clinical medicine modules. It can be seen that most of the top-ranked schools in the fifth round of subject evaluation have integrated and innovated their curriculum models.

Table 3 The ways of offering professional courses in the institutions

Subject Evaluation	Institution	Basic Medicine	Clinical Medicine
A+	Shanghai Jiaotong University	Traditional course + module integration course	Traditional Course + Organ System Integration Course
A+	Zhejiang University	Traditional Course + Medical Comprehensive Course	Traditional Course + Medical Comprehensive Course
A-	Huazhong University of Science and Technology	Traditional courses + PBL special topic teaching	Traditional courses + PBL special topic teaching
A-	Sichuan University	Traditional course	Traditional courses + system integration clinical courses
B+	China Medical University	Module integration course	Traditional course
B+	Chongqing Medical University	Traditional course	Traditional course
B	Tianjin Medical University	Traditional courses + basic medical integration courses	Traditional courses + clinical medicine integration courses
B	Wuhan University	Module integration course	Traditional course
B-	Wenzhou Medical University	Traditional course	Traditional course
B-	Guangzhou Medical University	Traditional course	Traditional Course + PBL Course
C-	Shihezi University	Traditional course	Traditional course
C-	Southwest Medical University	Traditional course	Traditional course

3. Discussion

3.1 Break the traditional structure and build a modular curriculum system

Modular curriculum system means that the entire curriculum system is composed of several complete course modules, and each module is composed of several courses[5]. The current domestic clinical medicine course structure is rigidly designed, most of which are traditional horizontal course group structures, and it is difficult to achieve cross-integration of disciplines in the training process. This study proposes a five-year modular curriculum system for clinical medicine majors (Figure 2), which divides clinical medicine

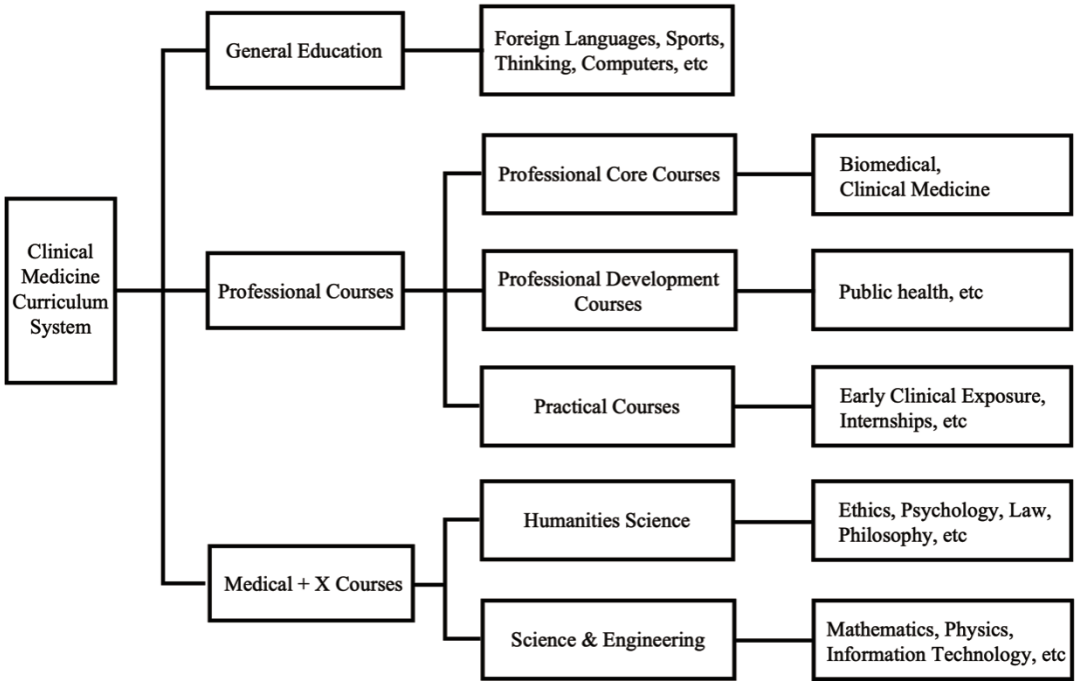

Figure 2. Five-year modular curriculum system of clinical medicine

majors into three modules: general education, professional courses, and medical + X courses, among which professional core courses are compulsory courses. The medical + X course is an introductory optional course, and the rest of the courses include compulsory and optional courses.

3.2 Set the primary role of humanistic education in medical study

Medicine is a subject which has both scientific and humanistic attributes. New Medical Science not only requires higher education to cultivate new medical science and technology talents with innovative spirit and multidisciplinary knowledge, but also emphasizes that medical students should have noble medical ethics and humanistic qualities. This study concludes that the domestic institutions have little attention on humanistic subjects. Higher education for medicine should clarify the primary role of humanistic education, strengthen the combination of medicine and humanities, enrich the types of humanities and social science courses, expand the scope of curriculum knowledge, improve the allocation of credits and hours, and strengthen the humanistic quality, moral decision-making, and social responsibility of medical students, communication skills, etc.

3.3 Integrate and optimize professional courses to improve learning efficiency

In the current teaching of clinical medicine, the courses are mainly set up around the subject-disease model. In this way, the same knowledge might be repeatedly taught, and the teaching content is scattered in different semesters. Therefore, the optimization of the five-year curriculum system for clinical medicine majors should integrate the medical professional curriculum with the organ-system as the center. First, integrate the teaching content to form a new course with good structure, to form a new well-arranged, structured course system with less content repetition. By this, advantages of integration will be produced [6]. Additionally, according to the learning process of the human body system from shallow to deep, the course semester can be rearranged to cultivate students' overall concept, better establish a knowledge system, and improve learning efficiency.

3.4 Make dual focuses for both compulsory and optional courses and construct the Medical+X curriculum system

The New Medical Science subverts the traditional single and specialized medical talent training mode, and proposes to cultivate interdisciplinary compound medical talents [7]. Higher education is suggested to offer a variety of optional courses, such as interdisciplinary courses including Science and Engineering, Humanities and Social Sciences, Art Accomplishment, and Information Technology, etc [8]. Meanwhile, making professional integration courses compulsory, taking Science, Engineering, Management, Humanities and Social Sciences as optional courses, adapting to the medical + X course system of "New Medical Science" construction, and paying equal attention to compulsory credits and optional credits. Finally, taking students as the center, guide students to pay attention to the frontiers of the development of various disciplines, and freely choose professional courses such as Science, Engineering, and Liberal Arts according to the training objectives and students' interests.

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