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Analysis of the Pros and Cons of the Current Chinese Medicine Education System and Strategies for Improvement

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Abstract: The current system of Chinese medicine education is centered on institutional education, teacher-training education, and continuing education, and it has realized the dynamic match between the supply of talents and the demand of the industry through large-scale cultivation, innovative teacher-training integration, and multi-dimensional continuing education. However, there are still problems such as the disconnection between the theory and practice of institutional education, the limited development of teacher-training education on a large scale, the uneven quality of continuing education, the conflict of combined education of traditional Chinese medicine and Western medicine, and the obstruction of internationalized education. This paper proposes to reconstruct the institutional curriculum system, innovate the stratified classification system of teacher training, strengthen the practice orientation of continuing education, promote the in-depth integration of Chinese and Western medicine, and improve the policy guarantee mechanism, and other improvement paths, aiming to build a new type of Chinese medicine personnel training system that emphasizes both classical inheritance and modern innovation, and the complementarity between institutional education and teacher training, so as to provide a decision-making reference for the sustainable development of Chinese medicine education.

Keywords: Institutional education; Teacher training; Continuing education; Pros and cons analysis

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1. Introduction

Chinese medicine, as the “art of Qi and Huang” inherited for thousands of years, condenses the life wisdom and cultural genes of the Chinese nation and is an important carrier to maintaining the continuity of Chinese civilization. Its essence is guided by the philosophy of the unity of heaven and mankind, exploring the laws of human life and health through a dynamic and balanced way of thinking, and forming a unique theoretical system in thousands of years of practice [1]. In the theoretical construction and practical verification of successive generations of medical doctors, Chinese medicine has gradually established a complete medical

system with the doctrine of yin and yang and five elements as the theoretical foundation, and the holistic view and the methodological core of diagnosis and treatment. As an original medical science with independent intellectual property rights, it has not only ensured the reproduction of the Chinese nation for generations but also played an irreplaceable role in the fields of disease control and health care [2]. However, with the rapid development of modern biomedicine, traditional Chinese medicine (TCM) is facing serious challenges in theoretical interpretation and clinical transformation. In particular, the problem of adaptability between the TCM personnel training system and the contemporary medical education model is becoming more and more prominent. Although the current higher education in TCM has formed a three-stage training system of "institutional education—post-graduation education—continuing education," the effectiveness of the training of clinical practice ability is still insufficient. This kind of education status quo, which is disconnected between theory and practice, and unbalanced between inheritance and innovation, seriously restricts the sustainable development of Chinese medicine. Based on the perspective of system theory, this paper analyzes the existing problems of the education system of Chinese medicine and explores the path of its innovation and development through the combination of literature analysis and case study to provide decision-making references for the construction of Chinese medicine personnel training system that meets the needs of the times.

2. Overview of the current Chinese medicine education system

The education system of Chinese medicine is centered on institutional education, teacher training, and continuing education, forming a multi-level and multi-dimensional training framework that combines the dual characteristics of traditional inheritance and modern standardization [3].

Institutional education is the mainstream of Chinese medicine education, covering specialist, undergraduate, master's degree, doctoral degree, and other levels of training; where specialist education is usually three years, the curriculum is mainly designed to cultivate students' basic theories and skills, which is suitable for the needs of primary health care; undergraduate education is usually five years, the curriculum includes basic theories of Chinese medicine, diagnostics, traditional Chinese medicine, pharmacology, Neijing (Internal Classic of Medicine), typhoid fever, the Essentials of the Golden Gui, warm diseases, etc., knowledge of Chinese medicine like acupuncture, moxibustion, etc., as well as modern medicine. In addition to theoretical knowledge, a clinical internship is required, a process that is usually completed in affiliated hospitals or cooperative medical institutions [3,4]. Master's and doctoral degree programs in TCM usually last for three years, with the master's degree focusing on deepening TCM theory and clinical skills, and the doctoral education focusing on TCM research and advanced clinical skills.

Teacher education in TCM is a traditional teaching model that helps apprentices master TCM theories and clinical skills mainly through oral transmission from master to apprentice. This mode places special emphasis on practical teaching and the transmission of clinical experience. However, with the development of the times, the form of modern TCM teacher education has changed. Nowadays, it is more often the case that students in medical schools, on the basis of theoretical learning, follow experienced Chinese medicine practitioners in clinical practice to deepen their understanding of Chinese medicine knowledge and their ability to apply it through the actual diagnosis and treatment process. This combination of traditional teacher training and modern education retains the essence of teacher training and adapts to the needs of the modern medical education system [5-8].

Continuing education in Chinese medicine is a lifelong learning system for practicing Chinese medicine

practitioners, aiming to help them keep abreast of the development of Chinese medicine disciplines and improve their clinical diagnosis and treatment expertise and professional competence through systematic and diversified forms of education. Currently, the main forms of education include: thematic training courses focusing on specific diseases or techniques, academic conferences bringing together cutting-edge achievements of the industry, online courses relying on digital platforms, and clinical training programs with teachers. This continuous education mechanism not only makes up for the slow updating of knowledge in traditional teacher training but also promotes the modernization of TCM practitioners' diagnostic and therapeutic capabilities based on inheritance through the closed-loop model of "theoretical learning-clinical practice-technical iteration" [9,10].

It should be noted in particular that after completing systematic professional education in Chinese medicine, practitioners are not yet legally qualified to independently carry out Chinese medicine practice. According to the Law of the People's Republic of China on Medical Practitioners, a practitioner must pass the qualification examination for TCM practitioners, which consists of a dual assessment system of written theoretical tests and practical skills, in order to obtain a practicing certificate and legally practice medicine [11]. In addition, the career development path of Chinese medicine practitioners is closely related to the title system, where they can be promoted step by step through the health professional and technical qualification examination to the titles of attending physician, deputy chief physician, and chief physician. The evaluation criteria cover the assessment of clinical efficacy, academic output, difficult cases handling ability, and other multi-dimensional indexes, and require the completion of the compulsory continuing education hours. This dual-track mechanism of "access-promotion" not only ensures the standardization of the quality of Chinese medicine services but also promotes the lifelong professional growth of practitioners through a ladder system of competency certification.

In recent years, the application value of TCM in the fields of chronic disease management, rehabilitation therapy, and disease prevention has received increasing international attention, which has given rise to a new trend of globalization and development of TCM education. The World Health Organization (WHO) included for the first time a chapter on traditional medicine in the International Classification of Diseases, Eleventh Edition (ICD-11), marking the further consolidation of the legitimacy of TCM theories and practices in the international healthcare system [12]. Developed countries such as the United States, Germany, and Australia have incorporated acupuncture, moxibustion, and traditional Chinese medicine into their higher education systems and offered localized TCM courses. Currently, the internationalized education of TCM is mainly promoted through the following modes: (1) Transnational joint education: Beijing University of Traditional Chinese Medicine (BUTM) and Middlesex University of the United Kingdom (UK) jointly set up a bachelor's degree program in TCM, and Henan University of Traditional Chinese Medicine (HUTM) established an overseas branch in Malaysia [13]; (2) Cultural dissemination platform empowerment: Hundreds of Confucius Institutes around the world have added Chinese medicine courses, combined with workshops and experiential camps, to popularize practical techniques such as Tai Chi and acupressure to the overseas public [14]; (3) International special training program: WHO and China have jointly launched the "Traditional Medicine Cooperation Center" program to train medical personnel in countries along the "Belt and Road" in Chinese medicine diagnosis and treatment techniques, and to help improve the capacity of local primary medical services [15]. Such cooperation not only accelerates the cross-border flow of TCM knowledge and technology but also promotes TCM as an important part of global health governance by building a synergistic network of "policy, education, and industry."

3. Analysis of the advantages of the current TCM education system

3.1. Facilitating the scale and standardization of the training of Chinese medicine talents

Through unified teaching materials, standardized curricula, and standardized management, modern TCM institutional education is driven by a modularized curriculum system and a national unified licensing examination system, both through "theory-practice" spiral teaching to establish the knowledge and ability benchmarks, and to realize the large-scale cultivation of TCM talents [16]. Xu *et al.* found through a cross-sectional survey that nurses in tertiary general hospitals scored significantly higher than nurses in secondary hospitals in terms of their knowledge of TCM nursing techniques, suggesting that institutional education has a positive effect on the systematic construction of the knowledge system [17]. By 2022, TCM graduates have risen from 59,900 to 135,500, an increase of 76,500, with an average annual growth rate of 9.67% [18]. This model provides TCM practitioners with a solid foundation and broad knowledge. In order to meet the differentiated needs of primary healthcare institutions, TCM specialty hospitals, and research platforms for talents, modern TCM education has built a three-stage progressive cultivation system, namely, "vocational and technical education, undergraduate general education, and postgraduate innovation education." Under this structure, higher vocational colleges and universities focus on practical technology and output skilled talents; undergraduate education strengthens the cross-fertilization of classical curriculum and modern medicine; and master's and doctoral postgraduate education deepens the cutting-edge research on the prevention and treatment of major diseases in traditional Chinese medicine through the National Key Research and Development Program ("Modernization of Traditional Chinese Medicine" special project), Qihuang Scholars' Mentor Team, and other carriers. The researchers have also been working on the development of the Chinese medicine industry. Statistics show that from 1996 to 2015, the number of SCI papers on Chinese medicine in China rose from 111 to 9,437, with an 85-fold increase in the annual number of papers issued during the 20-year period [19]. This hierarchical education model not only realizes the dynamic match between the talent supply structure and the industry job demand but also drives the transformation of TCM discipline from empirical medicine to evidence-based medicine paradigm.

3.2. Innovative integration of teacher education improves the quality of TCM talent cultivation

Teacher training is centered on clinical practice, and experience is passed on through personalized guidance by tutors. The current education system of Chinese medicine colleges and universities institutionalizes the teacher training model embedded in the talent training process through the "early clinical-mentorship" dual-track mechanism to make up for the defects of standardized teaching and clinical disconnect. For example, Zhejiang University of Traditional Chinese Medicine has implemented the "Famous Doctor Studio Follow-up Program," which requires undergraduate TCM students to complete eight hours of clinical practice per week, and systematically participate in the whole process of diagnosis and treatment such as history-taking, four-diagnosis, and acupuncture prescription under the guidance of the deputy chief physician and tutors. This kind of practice breaks through the boundary of the traditional teacher-apprentice system, forming a three-stage competence development model of "observation-assistance-semi-independent operation" [20]. It is noteworthy that digital technology is reconfiguring the experience transmission model. For example, AI-assisted Chinese medicine diagnosis system, students can use an AI-assisted Chinese medicine diagnosis system for clinical thinking training, and generate structured learning maps and realize the explicit transfer of tacit knowledge through the AI analysis of diagnosis and treatment decision-making logic [21]. This new type of "institutional guarantee, technology-enabled" teacher-training system not only retains the advantages of personalized training, but also

realizes the quality control of teaching through the Mini-CEX scale and other tools, providing a standardized paradigm for the growth of Chinese medicine talents.

3.3. Multidimensional adaptation and innovative development of continuing education guarantees continuous improvement of TCM talents' professional levels

Continuing education in Chinese medicine builds a lifelong learning system that meets the needs of professional development through the "platform-content-certification" trinity model. Its flexibility is reflected in: (1) Time and space elasticity: Relying on mobile learning platforms (such as "Qihuang e-learning" app), grassroots physicians can independently choose online live broadcasting, case library access, AI simulation diagnosis and treatment, and other forms of learning [22]; (2) Modularization of the content: Tiered course packages are set up for different ranks, such as the resident should emphasize basic skills and humanistic qualities [23], attending physicians need to highlight clinical thinking and difficult case management [24], and associate physicians should focus on scientific research, teaching management, and complex case management [25]; (3) Education hybridization: A hybrid continuing education method, i.e., "online + offline" hybrid teaching mode is adopted, combining the advantages of online learning and offline practice, which can effectively improve the learning effect and skill level. For example, in disaster nursing continuing education for orthopedic nurses, online + offline blended teaching significantly improved the scores of the theory and skills assessment, the scores of the disaster nursing core competency scale, and the scores of the disaster relief attitude assessment questionnaire [26]. In addition, the rain classroom-based blended teaching model combined with the mind mapping construct also showed significant advantages in developing independent learning ability and sharing learning content [27].

4. Deficiencies in the current system

4.1. Difficulty in realizing the organic combination of theoretical teaching and practice in institutional education

The current education in TCM colleges and universities is generally characterized by problems such as insufficient basic skills in medicine, unsystematic knowledge structure of TCM, and disconnection between theory and practice, etc. There is a significant tendency to emphasize theory but not practice [28]. Taking the five-year undergraduate education as an example, the traditional "4+1" segmentation model (four years of theory + one year of internship) cuts the continuity of cognitive construction. Cognitive neuroscience research has shown that the unique imagery thinking of TCM (e.g., "elevation of qi" and "five elements") needs to be internalized in depth through embodied cognition in clinical situations. However, about 83% of the abstract concepts taught in core courses such as Basic Theory of Chinese Medicine are still confined to the classroom environment, resulting in students falling into the cognitive dilemma of "mechanical memorization, rapid forgetting" [29].

In addition, there is also a shortage of clinical teaching resources. At the hardware level, the number of beds in hospitals affiliated with many provincial TCM colleges and universities is less than 800, making it difficult to meet the practice demand of 0.3 beds per capita for students [30]; at the software level, the clinical ability of teaching staff varies, and many clinical teachers have less than 2,000 outpatient visits per year, which makes it difficult to provide high-quality demonstration of casework for students. In terms of the application of modern technology, although most of the institutions have introduced virtual simulation laboratories, the application of technology mostly stays at a shallow level such as "three-dimensional demonstration of acupuncture points," and there is an obvious lack of interaction in the key competence training links.

4.2. Realistic dilemmas in the development of teacher education on a large scale

Currently, Chinese medicine teacher education is facing structural contradictions: Firstly, the aging of high-quality teachers and the insufficient clinical experience of young teachers have posed significant challenges. Meanwhile, the success of renowned Chinese medicine practitioners has been largely dependent on long-term apprenticeship, typically lasting 10 to 15 years on average, resulting in potential disruptions in the inheritance of tacit knowledge [31]. Secondly, the knowledge transformation rate of the teacher-training education model is low, and the traditional "one-to-one" model has the defects of planarization and homogenization, which is difficult to adapt to the needs of scaling. The average daily number of patients in the expert clinic is 40, but the students can only observe 2–3 typical cases, and the knowledge conversion rate is less than 15%. More seriously, the burden of scientific research squeezes clinical time. Studies have shown that research pressure is negatively correlated with teaching initiative, and excessive quantitative assessment leads to the weakening of clinical ability [32]. This tendency of "laboratorization" has weakened the ability of some teachers to identify evidence and treatments, making it difficult to instruct students in the dynamic analysis of complex disease mechanisms. In addition, the promotion of digital teacher training is also limited by the cost of technology and teacher training [33].

4.3. Uneven quality of continuing education

Currently, there are significant differences in program quality in the field of continuing education in Chinese medicine, which are manifested in the following areas: (1) Disconnect between course content and practice: Some training institutions are oriented to the completion of credit hour targets, and their course design does not follow the frontier of TCM disciplines (e.g., AI-assisted diagnosis and treatment technology). They still use outdated teaching materials, which leads to a low degree of match between the teaching content and the actual clinical needs. (2) Unitary teaching mode: There is an over-reliance on online recording and broadcasting courses, a lack of interactive teaching (e.g., case discussion, practical exercises), insufficient participation of students, and difficulty in realizing in-depth learning. (3) Formalized assessment mechanism: Some courses only use online question and answer or check-in time as the assessment standard, without setting up clinical skills assessment, resulting in the common phenomenon of "brushing the class time," which cannot truly reflect the effect of ability enhancement. (4) Stagnation of vocational competence: For example, in the continuing education of community nurses in Zhangye City, 65.58% of the nurses believe that the curriculum should strengthen rehabilitation nursing and traditional Chinese medicine techniques, but the existing training is still based on general knowledge, which is out of touch with the grassroots' needs [34]. (5) Declining trust in the profession: Low-quality training has led to lagging diagnostic and treatment skills among some practitioners, indirectly affecting patient outcomes and the credibility of TCM in society. (6) Policy goal deviation: The goal of "hierarchical, classified, and precise training" proposed in the "14th Five-Year Plan" of the State Administration of Traditional Chinese Medicine (SACTM) is difficult to realize due to implementation deviation, which restricts the overall upgrade of the service capacity of traditional Chinese medicine.

4.4. Conflict between Chinese and Western medicine education

There are structural contradictions in the integration of Chinese and Western medicine curricula. There are big controversies in the teaching mode and method of integrated Chinese and Western medicine education, especially in undergraduate teaching, the rationality and effectiveness of the curriculum, teaching content, and teaching methods are more prominent [35]. For example, the increase in the number of courses, the heavier academic workload, and the diversity of teaching methods have been observed, yet their effectiveness remains

inconsistent [36]. Many students of Integrative Medicine perceive the curriculum as a "mix of Chinese and Western approaches," resulting in confusion within the knowledge system. Although the combined model of problem-oriented learning and case teaching has improved clinical thinking in teaching, how to balance the holistic view of Chinese medicine with the reductionism of Western medicine, and how to promote the in-depth integration of Chinese and Western medicine is still a difficult problem.

Under the impact of the evidence-based system of modern medicine and the technological revolution, Chinese medicine education is facing a two-dimensional structural reconstruction: on the one hand, it needs to defend the integrity of the theoretical kernel, and on the other hand, it needs to build a mechanism of dialogue with modern medicine. Medical schools offer complementary medicine courses, but they cannot fully realize the organic integration of traditional theory and modern technology, reflecting the deep dilemma of cultural translation. The structural challenges are as follows: (1) Deep cognitive gap: Students in TCM colleges and universities are exposed to modern medical technology (e.g., genetic testing, diagnostic imaging) for a relatively small number of hours, resulting in the fragmentation of clinical practice, in which "pulse diagnosis is not abandoned, and imaging must be examined." (2) Conflict of research paradigms: In the Chinese medicine projects of the National Natural Science Foundation of China, there are a lot of molecular biology research paradigms, but only a small number of them can effectively explain the mechanism of the association of "signs and symptoms—prescription and medicine," which exposes the problem of the integration of the reductionist theory of Western medicine and the holistic view of Chinese medicine. (3) Clinical decision-making dilemma: Hospital doctors still prioritize the use of modern medicine in the treatment of acute and critical illnesses, while traditional therapies are mostly limited to the management of chronic diseases.

4.5. Restrictions on internationalized education in TCM

From the viewpoint of cultural cognition and theoretical system, there exists an obvious cognitive gap between China and the West, and the internationalization of Chinese medicine faces the obstacle of theoretical interpretation. Chinese medicine is centered on the doctrine of yin and yang and five elements, emphasizing the holistic view, dynamic balance, and unity of mankind; while Western medicine is based on the four elements of the ancient Greek theory of fluid pathology, emphasizing local anatomy and experimental verification, the two philosophical systems are difficult to be compatible [37]. For example, the concept of "qi" in Chinese medicine is often questioned as "pseudoscience" by Western scholars because it lacks a material entity [38]. In Russia, the inclusion of acupuncture in "reflexology" has diluted the cultural connotations of Chinese medicine, leading to its "de-Chinese-medicalization" [39].

The cross-cultural adaptation of educational resources also faces dilemmas, such as the structural imbalance of teachers and the translational bottleneck of localization of teaching materials. Data on overseas TCM education show that 78% of the core curriculum is still undertaken by expatriate Chinese teachers, and only 12% of the local teachers have a systematic TCM education background [40]. TCM terminology and concepts are difficult to convey accurately when translated into other languages. For example, the concepts of "yin and yang" and "five elements" in Chinese medicine do not have direct equivalents in English, which leads to the loss or misunderstanding of information in the translation process. A comparative analysis of the textbooks shows that in the English version of *Basic Theory of Chinese Medicine*, only the chapter of "Five Elements" has a cultural translation loss rate as high as 63% [41,42].

The standard of systematic construction of TCM education also varies among countries. To ensure the quality and competence of TCM practitioners, many countries and international organizations are making

efforts to develop and implement self-regulatory standards for education and training [43]. However, they still face problems such as large differences in assessment standards and insufficient clinical competence of students. Acupuncturists in some countries only need 500 hours of training to practice, which is much lower than the Chinese standard [44], and the mobility of talents is severely limited.

5. Suggestions for improvement and breakthrough paths

5.1. Restructuring of institutional curricula

We need to promote the integration of theory and clinical practice to further strengthen students' clinical practice skills. The "early clinical + classical reinforcement" model should be implemented, such as the penetration of traditional culture and thinking training in the teaching of "Internal Canon," to enhance the coherence of students' thinking in Chinese medicine [45]. Setting contextualized teaching mode, for example, we can embed the "ward live classroom" in the course of "TCM Diagnostics," presenting the four diagnostic processes of the leading physician in real time through 5G transmission; the students synchronously carry out remote diagnosis and analysis, constructing the AI model of TCM diagnosis and treatment decision tree, training the neural network based on real cases, and carrying out diagnostic training through the virtual patients. Conversation robots for evidence identification training and real-time feedback from the system on diagnosis and prescription bias provide an in-depth drive to integrate theoretical learning with clinical practice. We should strengthen cooperation with medical institutions, provide students with more abundant and diversified internship opportunities, and strengthen blended teaching (online theory + offline practice) to better solve the problem of fragmentation between theory and practice [46]. It enables students to obtain valuable opportunities to learn and exercise in real medical environments so that they can better understand and master what they have learned. This cooperation model not only promotes the organic combination of theory and practice but also delivers fresh talent with potential and vitality to medical institutions, realizing a win-win situation.

5.2. Innovations in the teacher education system

We have designed a tiered mentor system, constructed a three-tier mentor echelon of "national masters-provincial famous doctors-grass-roots cadres," and implemented a differentiated teaching program. The national mentors will focus on the inheritance of academic ideas, guide students to explore the profoundness of traditional Chinese medicine through in-depth analysis of the essence of Chinese medicine theories, and encourage them to form independent academic insights. Provincial famous doctors will focus on cultivating students' clinical diagnosis and treatment ability through practical exercises and case analysis, so that students can master the diagnosis and treatment skills of diseases in practice and enhance their ability to solve practical problems. Primary Backbone Mentors, on the other hand, focus on the teaching of primary care practice, emphasizing the practicality and popularity of healthcare services. By guiding students to conduct internships in primary care institutions, students are able to understand the current situation and challenges of primary care, and cultivate the awareness and ability to take root in the grassroots and serve the public [47]. The design and implementation of this system aims to effectively improve students' professional skills and comprehensive quality in a targeted manner and to cultivate more excellent talents for the inheritance and development of Chinese medicine. In addition, we can also expand the coverage of mentorship through the establishment of a "Regional Sharing Platform for Famous Doctors," expand the coverage of mentorship through teleconsultation and cross-institutional follow-up, and draw reference from Hong Kong's "Chinese Medicine Specialist Training Scheme" to formulate standards of specialization and promote specialist teacher training [48].

5.3. Enhancing the quality of continuing education

A demand-oriented approach is adopted in the design of continuing education, with course development based on job competency analysis. For example, in Zhangye City, a "four-module" framework (professional quality, basic skills, core skills, and comprehensive ability) was designed for community nurses, incorporating 160 hours of practical training to enhance the program's applicability [34]. The supervision of continuing education is strengthened to ensure course quality through the establishment of a comprehensive "declaration-implementation-assessment" management system. A system of random checks has been improved, and an assessment mechanism has been established. A review group, composed of provincial departments overseeing traditional Chinese medicine in collaboration with tertiary hospitals, colleges, and universities, has been set up to conduct dynamic audits of course content and teacher qualifications. A red and yellow card system for course quality has been implemented, whereby contractors receiving student satisfaction ratings below 70% for two consecutive years will be disqualified from submitting courses. Low-quality courses are eliminated, and a regularly updated "quality course catalog" is published. Assessment methods are enhanced with a stronger emphasis on practical evaluations. In addition to existing theoretical assessments, practical components such as video submissions of clinical consultations with instructors and case analysis defenses have been introduced, with the weight of practical assessments being increased. A resource-sharing platform has been developed, leveraging the National Base for Continuing Education in Chinese Medicine. High-level instructors have been integrated to develop standardized course packages, facilitating the dissemination of resources through open sharing.

5.4. Deep integration of Chinese and Western medicine and innovation

Greater emphasis should be placed on promoting "cultural integration" rather than mere "technological superposition" between Chinese and Western medicine. The "cultural adaptation theory" should be applied to enhance the complementarity between Chinese medicine principles and Western evidence-based medicine within the curriculum, rather than simply "juxtaposing knowledge" [49]. The content of modern medicine courses should be actively expanded to include not only fundamental medical theories and clinical diagnostic and treatment techniques but also the latest medical research findings and practical advancements [50]. At the same time, the integration of Chinese and Western medicine has become a key focus of educational reform. This is being pursued through the establishment of specialized courses, including classical Chinese medicine theory, acupuncture and massage, and traditional Chinese medicine, while also incorporating interdisciplinary teaching by interweaving modern medical curricula. Such an approach is intended to enhance students' ability to apply evidence-based thinking, enabling them to master precise diagnostic and treatment techniques in Western medicine while gaining a profound understanding of the holistic concepts and evidence-based principles of Chinese medicine. For example, the multidisciplinary collaboration model in oncology teaching has been shown to improve students' integrated diagnostic and treatment capabilities through joint case discussions between Chinese and Western medicine practitioners [51]. In advancing the integration of Chinese and Western medical technologies, innovative approaches are being explored. The "Intelligent Tongue Diagnostic Instrument for Chinese Medicine," developed by Shanghai University of Traditional Chinese Medicine, has successfully established correlations between tongue features and metabolomics data by training on two million image cases, achieving an 89% accuracy in the correlation between tongue diagnosis and laboratory indicators [52]. Additionally, the latest NCCIH-funded "Multi-Organomics Study of Acupuncture Neuromodulation" is pioneering an interdisciplinary research paradigm that connects acupuncture sensory transmission with brain

network regulation. This approach of "interpreting traditional wisdom in modern language" may serve as a critical breakthrough in overcoming cultural barriers [53].

5.5. Policy guarantees and long-term mechanisms

The national standards for the quality of Chinese medicine education will continue to be improved, with specific guidelines established for the construction of clinical practice bases. Mandatory indicators, such as the per capita area for practical training and the number of standardized diseases covered, will be clearly defined. Teacher-training education will be incorporated into the system of undergraduate teaching audits and institutional evaluations. Innovations in the talent incentive mechanism will be implemented, ensuring that the process of "Chinese medicine training-teacher training-title promotion" is effectively integrated. The attainment of a provincial-level or higher teaching certificate will be recognized as equivalent to continuing education credits. Additionally, medical institutions that achieve significant results in integrating traditional Chinese and Western medicine will be granted preferential policies in medical insurance reimbursement and scientific research funding.

6. Conclusion

Chinese medicine education continues to evolve through both inheritance and innovation. While the current education system benefits from its scale and standardized training, challenges remain, such as the disconnect between theory and practice and the limited scope of teacher-training education. By strengthening clinical practice, expanding teacher-training programs, improving the quality of continuing education, promoting the integration of Chinese and Western medicine, and enhancing policy guarantee mechanisms, the TCM education system can be further refined to support its sustainable development. Through these systematic improvements, a modernized TCM talent cultivation system can be established—one that balances classical inheritance with contemporary innovation, integrates institutional education with teacher training, and effectively combines the essence of TCM with Western medical advancements. This approach will address core issues in TCM education, including the gap between theoretical knowledge and practical application, as well as the challenge of maintaining a balance between tradition and modernization.

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