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Cultivation of "Clinical-Research" Compound Talents for Master's Degree in Traditional Chinese Medicine: Dilemma and Reform Thoughts on Integration of Scientific Research under Scientific Research System

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Abstract: Under the current medical education reform, the "clinical-research" model for TCM master's degrees is a key approach to advancing the modernization of traditional Chinese medicine. With the core of "dual-track integration," this model aims to enhance both clinical practice and research abilities simultaneously. However, ten years of practice have shown that it still faces multiple challenges: an imbalance between clinical rotation time and research investment, deeply rooted attitudes that prioritize clinical work over research, insufficient TCM research resources and fragmented platforms, and poor coordination between policy and teaching design. These issues, particularly the methodological differences between TCM experience-based medicine and modern evidence-based medicine, further complicate the integration of clinical and research efforts. Therefore, there is an urgent need to promote the deep integration of research training into clinical practice through system design, value orientation, and evaluation systems, fostering a new ecological environment where clinical and research efforts thrive together. This will help cultivate TCM professionals with both strong clinical skills and innovative research capabilities, providing sustained momentum for the high-quality development of traditional Chinese medicine.

Keywords: Traditional Chinese medicine professional master; Clinical-research integrated talents; Research integration dilemmas; Integration with evidence-based medicine; Training model reform

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1. Introduction

Since 2015, in order to improve the clinical diagnosis and treatment level of Chinese clinicians, a "dual-track" medical personnel training model has been comprehensively implemented [1]; i.e., professional master's degree training in medicine (hereinafter referred to as "master's degree") and standardized residency training

(hereinafter referred to as “training”). (hereinafter referred to as “training”). Over the past ten years, the “dual-track” personnel training model has trained a large number of clinical practice skills, strengthened the ability of postgraduate students in Chinese medicine to solve clinical problems, and to make the diagnosis and treatment of different diseases more standardized, and to open up a new type of Chinese medicine hospitals combining Chinese and Western therapeutic features; with the repeated practice of the system and thinking. Behind the benefits of “four certificates in one” for TCM postgraduates under the “two-track” system is the need for contemporary postgraduates to have clinically oriented scientific research ability and comprehensive mastery of basic clinical knowledge, basic theories, and basic skills [2]; and at present, under the entire master training system, there is a lack of clinical research ability. The entire master’s degree training system under the students and the expected results there is a certain gap, most of the students must be completed in the three years of postgraduate no less than 33 months of departmental rotation, but also need to complete a certain amount of scientific research and academic research in their own time to improve their innovation ability, which leads to the majority of the students want to grasp both hands, but in the end it may turn into the clinic and scientific research on both sides of the no achievement! The situation. Therefore, for the cultivation of “clinical-scientific research” composite talents for the master’s degree in Chinese medicine: how to improve the innovation ability, integrate scientific research into the training study, as well as convert one’s own clinical experience into scientific research has been a major issue in the development of Chinese medicine at present.

2. In-depth thoughts on the dilemma of research integration under the regulation system

2.1. Great imbalance between clinical rotation time and research hours

The training management system requires that graduate students have at least 33 months of three-year departmental rotation training time, which greatly compresses the time for scientific research, and the introduction of scientific research and the cultivation of scientific research thinking are not achieved overnight; during the training rotation period, a large number of clinical skills training, standardized training in clinical case writing, and the cultivation of the ability to independently receive and manage patients [3], which makes the majority of graduate students afraid of scientific research, and the majority of graduate students have to delay the study of scientific research due to the heavy burden of clinical training. Although some students have the intention to learn research-related knowledge, but due to the heavy clinical training tasks, the study of scientific research is also delayed again and again; Secondly, the great compression of the length of scientific research, resulting in many students are difficult to systematically learn the scientific research methodology, to build a complete academic system of scientific research, for the scientific research of the understanding of the surface only, due to the great reduction in the length of the scientific research, the students are difficult to complete the long time-consuming animal experiments.

2.2. It is difficult to change the thinking of Chinese medicine postgraduates who emphasize on clinical rather than scientific research

Society generally believes that the master’s degree in Chinese medicine graduate students will only bury their heads in the learning of obscure and difficult to understand the theory of Chinese medicine and clinical skills and practical ability is far less than the general medical master’s degree graduate students [4], this deep-rooted concept also causes the training unit especially focus on strengthening the master’s degree in Chinese medicine graduate students in clinical practice skills training; hospitals to provide a platform for the development of

students' clinical thinking and students to deal with the handling of complex clinical problems, repeated training The hospital provides a platform to cultivate students' clinical thinking and students' ability to deal with complex clinical problems, and repeatedly trains students' clinical practice skills, but the learning of discipline theory is relatively lacking. Due to the heavy medical tasks of various departments in hospitals, the teaching hours are usually compressed, and the cycle of small lectures and teaching practice classrooms is greatly shortened or even skipped, so that students can only rely on students to learn theoretical knowledge privately, not to mention the teaching of clinical scientific research methodology. From the students' point of view, many of them think that they are clinical talents cultivated for the society, and scientific research is only a "stepping stone" for promotion and salary increase in their future career; therefore, during the three years of postgraduates' training, they do not pay attention to scientific research, and they mistakenly enter into the misunderstanding that scientific research is equal to issuing articles. Therefore, during the three years of postgraduate training, no attention is paid to scientific research, which leads to the misunderstanding that scientific research is the same as publishing articles, and although there are outputs during the three years, they are not of high quality.

2.3. Lagging research resources and failure to maximize research efficiency in TCM

After the outbreak of the new crown epidemic, the state to encourage the development of traditional Chinese medicine, to promote the development of Chinese medicine innovation has been increasing the strength of Chinese medicine colleges and universities of scientific research projects to give a lot of support, therefore, Chinese medicine colleges and universities in recent years to undertake scientific research projects have also gradually increased; however, some studies have shown that 40% of Chinese medicine colleges and universities of scientific research resources utilization is a declining trend, which is affected by the decline in technological efficiency and technological retreat However, studies have shown that the utilization rate of scientific research resources in 40% of Chinese medicine colleges and universities is declining, of which 70% and 80% are affected by the decline in technical efficiency and technological degradation, respectively [5], which shows that Chinese medicine colleges and universities suffer from a lack of talents in scientific research as well as low efficiency in scientific research transformation; in addition, the clinical research platform is fragmented, and many clinical training teaching and training bases are far away from the laboratories, which makes it inconvenient to study and conduct animal experiments; the database of traditional Chinese medicine is weak, and the digitization of antique books is relatively lagging behind, which significantly lowers the efficiency of literature search. Clinical teaching and scientific research tasks of tutors are heavy, coupled with the fact that a tutor with several postgraduate students, teaching load overload, and the large number of daily outpatient clinics, resulting in tutors in the scientific research guidance of students greatly shortened time.

3. Dialectical analysis of the root causes of the dilemma

3.1. Policy regime and feasibility contradictions

The "dual-track" policy system was proposed to cultivate clinically oriented high-quality scientific research complex talents, and the postgraduates complete the course of study and training in three years, so as to cultivate not only clinical talents capable of dealing with complex clinical problems, but also innovative talents with certain literature search, scientific research ability and experimental design ability, which is intended to shorten the cultivation cycle. The purpose of this program is to shorten the training cycle, but after ten years of practice, even though there are successful training of talents with both, most of the graduate students with master's degree in Chinese medicine are still not in line with the expectations. Many graduate students with

master's degree in Chinese medicine are seriously deficient in scientific research, which is attributed to the following reasons: firstly, it is difficult to connect the knowledge learned in the course with the content of the training. Firstly, it is difficult to connect the knowledge learned in the course with the training content. In the beginning of the training period, although the introductory course of scientific research such as writing and research of scientific research method is offered, the course cycle is short, and the learning of scientific research method is only generalized, and then up to 33 months are spent in the hospitals for the training, which makes the weak knowledge forgotten; secondly, the design of practical content of the training is relatively fixed. In addition to the fact that many of the training hospitals are separated from the basic laboratories, the majority of graduate students of the specialization degree seldom carry out animal experiments, and it is difficult to make great innovations and discoveries. Often in form [6], scientific thinking and scientific research ability are difficult to improve.

3.2. Difficulties in integrating TCM education with modern evidence-based medicine

As we all know, Chinese medicine as empirical medicine, in the understanding of disease and disease intervention and treatment theory is very different; Chinese medicine theory emphasizes the "unity of heaven and man", "holistic concept", emphasizes the treatment of "people Chinese medicine emphasizes the "unity of heaven and man" and the "holistic concept", stressing the treatment of the "human being" rather than the treatment of the "disease"; physiology is based on qi, blood and fluid, focusing on the regulation of the body's Yin and Yang to achieve equilibrium; In the diagnosis and treatment of disease, emphasis is placed on the identification of the evidence of the disease, as long as different diseases are consistent with the disease mechanism and pattern of the disease, the same treatment can be used. A classic example is Zhang Zhongjing's application of Gui Zhi Tang, which can be used to treat sun stroke in exogenous diseases and also to treat malignant obstruction in pregnancy, both of which share the common pathogenetic mechanism of Ying and Wei disharmony. However, there is a lack of evidence-based basis for why the same treatment for different diseases is effective, or why certain prescriptions in Chinese medicine have been tried and tested repeatedly; in contrast, the origin of Western medicine has a strong evidence-based basis for digging out the physiological basis of diseases and pathological changes at the micro level. Although the current Chinese medicine is booming, but its social acceptance still exists a certain degree of doubt. To improve the social credibility and acceptance of Chinese medicine, the experience of efficacy is often not enough; the new era of high-quality development of traditional Chinese medicine needs evidence-based evaluation.

The World Health Organization suggests that "the world should accept traditional medicine with an open mind, and traditional medicine to be widely accepted relies on the affirmation of the efficacy, of which the key link lies in the scientific nature of the research methodology" [7], which indicates the importance of the clinical efficacy of TCM and its scientific validation. The integration dilemma between TCM and evidence-based medicine is essentially a structural conflict between the two medical paradigms in the logic of evidence production. Despite the remarkable progress of evidence-based research in TCM in the last five years [8], its core contradiction is still not fundamentally resolved. Evidence-based medicine (EBM) takes randomized controlled trials (RCTs) as the gold standard, requiring fixed interventions and standardized outcome indicators, whereas the core of TCM evidence-based treatment lies in the "dynamic adjustment of prescriptions" and the "three factors of appropriateness", and this ontological difference has led to a serious lack of high-quality RCTs in TCM. This ontological difference has led to a serious lack of high-quality TCM RCTs.

3.3. Methodological fault lines

The disconnection of methodology stems from the crisis of adaptability between the knowledge system of TCM and the modern scientific research paradigm. While Western medical research can rely on mature cellular experiments, animal models and statistical tools to form a closed loop of transformation, the core competitiveness of TCM - discursive thinking and experience inheritance - has encountered technical bottlenecks. For example, the characteristic of pulse diagnosis, which is "difficult to understand under the finger", makes the accuracy of the existing equipment in recognizing complex pulse signs such as "moist and slow pulse" less than 58.3% (World Congress of Traditional Chinese Medicine 2024), which leads to the low popularity of the four diagnostic objectification tools in the clinic. In addition, the mining of ancient knowledge still relies on manual annotation, and the annotation of a single copy of the "Guide to Clinical Evidence" takes six person-months to complete, reflecting the efficiency bottleneck of traditional knowledge in the digitization process [9]. In terms of data analysis, when students tried to use SPSS to deal with the clustering of symptoms such as "Liver Depression and Spleen Deficiency", the Euclidean distance algorithm incorrectly combined the deficiency and reality categories at a rate of 41% (China Health Statistics 2023), exposing the limitations of the Western statistical methods in dealing with TCM evidence-based thinking. This phenomenon of "Westernization of TCM research" not only undermines the clinical value of TCM evidence-based treatment but also exacerbates the risk of alienation of the TCM knowledge system under the framework of modern scientific research [10]. The deeper problem lies in the fundamental difference between the ontological characteristics of the TCM knowledge system and the modern scientific research paradigm. TCM emphasizes individualized diagnosis and treatment and dynamic prescription adjustment, while modern scientific research pursues standardization, reproducibility, and quantitative indicators, and this paradigm conflict makes it difficult for TCM knowledge to be fully expressed and recognized in the existing scientific research system [11]. Therefore, the construction of a research methodology system that meets the characteristics of TCM has become a key path to promote the modernization and internationalization of TCM.

4. Reflections on the reform path

4.1. System innovation: dual-track synergistic mechanism reconstruction

In response to the "time zero-sum game" dilemma, the establishment of the "clinical-research equivalent conversion system", equivalent generation mechanism: clinical practice into scientific research capital, for example, independently dispose of a case of acute and critical illnesses counted as three equivalents, and the construction of specialized structured data sets is counted as five equivalents. The construction of disease-specific structured datasets counts as 5 equivalents. Exchange rules: 10 equivalents can be exchanged for 1 week of off-duty scientific research time, or for statistical consulting, experimental technical support and other services; in addition to strengthening policy protection: the revision of the "Chinese medicine training base assessment standards", requiring that the "equivalence conversion rate" ≥ 30%, i.e., 30% of the scientific research tasks need to be originated from clinical practice; to solve the dilemma of the tutor's resources, the implementation of the "three-step tutor synergy system." To solve the difficulty of tutor resources, the "three-stage tutor synergy system" is implemented: clinical tutors are responsible for refining clinical problems (e.g., the scientific value of typical medical cases in outpatient clinics); methodology tutors design research programs that fit the characteristics of TCM (e.g., real-world studies (RWS) instead of RCT); AI tutors (ancient books and big models) provide literature mining and correlation analysis of evidence and methods, and the three parties pass the "Clinical Research Arbitration Committee". The three parties coordinate conflicts through the "Clinical

Research Arbitration Committee" to ensure that the study design conforms to the logic of TCM evidence [12].

4.2. Reshape value orientation and competence certification to stimulate endogenous scientific research motivation

To effectively reverse the traditional thinking of "emphasizing clinical research over clinical competence", it is necessary to systematically promote the reform from three dimensions: cognition, competence, and evaluation. First of all, the concept of "scientific research is clinical competence" should be strengthened, and through course teaching, case sharing and practical guidance, postgraduates should be made to deeply understand that scientific research is not only an important means to improve clinical diagnosis and treatment, but also an effective tool to solve practical clinical problems, optimize diagnosis and treatment plans, and enhance clinical self-confidence. For example, a course or lecture on "Analysis of Successful Cases of Clinical Research in Chinese Medicine" can be organized, inviting well-known clinical scientists or clinical experts who have outstanding performance in improving the efficacy of scientific research to share their experience, and focusing on how scientific research can identify problems, raise scientific questions, verify treatment effects and promote the updating and optimization of treatment concepts in clinical practice. It also promotes the updating and optimization of diagnosis and treatment concepts.

In terms of competence training, the focus should be on the improvement of "practical clinical" scientific research competence, with emphasis on strengthening the ability of literature search and critical evaluation, the foundation of clinical research design (especially observational studies and practical RCTs), the application of basic statistics, medical ethics, scientific research integrity, and the ability of standardized collection and management of clinical data in TCM, as well as the ability to write standardized clinical case reports and systematic evaluations/meta-analyses. and the ability to write standardized clinical case reports and systematic evaluation/meta-analysis. The mastery of these competencies will not only help postgraduate students to quickly identify problems and design research protocols in clinical practice, but also improve the efficiency and quality of their research output.

In addition, a mechanism should be established to recognize the contribution of clinical research, such as the establishment of the "Rising Star of Clinical Research Award" and the "Best Clinical Problem Solving Award" at the hospital or college level to recognize students who have identified problems in clinical practice and applied research methods to make progress. The award should recognize students who have identified problems in clinical practice and made progress by applying scientific research methods, regardless of whether their research results have been published or not.

4.3. A revolution in evaluation systems: the three-dimensional competency radar model

In terms of the evaluation mechanism, we should break the traditional single evaluation mode that takes basic experimental research and high scores of SCI papers as the only criteria, and build a diversified and dynamic system of scientific research ability certification. On the one hand, the evaluation weights of "clinical research practice process" and "research outputs solving clinical problems" should be greatly increased, and the quality of "rotation unit embedded" research practice reports, the contribution of participating in clinical research projects by supervisors should be emphasized. On the other hand, we should explore the establishment of a system of "Clinical Research Competency Certification for Master of Science in Chinese Medicine," whereby passing the relevant module assessment or completing the specified type of clinical research project will be recognized as a graduation or an additional recognition.

On the other hand, we will explore the establishment of a "clinical research competence certification" system for the master's degree in Chinese medicine, whereby the assessment of relevant modules or the completion of specified types of clinical research projects will be used as the basis for graduation or additional recognition (such as recommendation letters and employment advantages). To break the constraints of "SCI-only" on Chinese medicine research, it is necessary to build an evaluation system with Chinese medicine characteristics and establish a three-dimensional competency radar model to comprehensively measure the clinical-scientific research composite competency of the Master of Science in Chinese Medicine. The model consists of classical application dimension (40% weight), clinical innovation dimension (30% weight) and research transformation dimension (30% weight): classical application dimension emphasizes the reasonableness of the use of prescription and the accuracy of ancient citation, reflecting the inheritance and innovation of traditional knowledge of Chinese medicine; clinical innovation dimension pays attention to the rate of optimization of the adoption of diagnostic and treatment plans (such as inclusion in the guideline) and the effect of the treatment of acute and critical illnesses, highlighting the innovative value of clinical practice; research transformation dimension focuses on the optimization and adoption rate of the treatment plan (such as inclusion in the guideline), highlighting the innovative value of clinical practice. The clinical innovation dimension focuses on the optimization and adoption rate of diagnostic and treatment protocols (e.g., inclusion in guidelines) and the effect of emergency and critical care, highlighting the value of innovation in clinical practice. Through this evaluation system, it can effectively guide the Master of Science in Chinese Medicine to achieve two-way empowerment between clinical and scientific research, promote the transformation of Chinese medicine scientific research from "thesis-oriented" to "clinical value-oriented," and provide solid support for the modernization and internationalization of Chinese medicine.

5. Prospect and development: Building a new ecology of clinical research in Chinese medicine by breaking up and establishing a new ecology

The predicament of "clinical-scientific research" composite talent cultivation for master's degree in Chinese medicine is essentially a systematic imbalance under the collision of traditional teacher-training education and modern scientific research paradigm. The zero-sum game of time, shackles of inertia, and resource efficiency exposed by the ten-year practice of "dual-track integration" are the deep-rooted contradictions that must be faced in the process of modernization of Chinese medicine. This paper proposes a three-dimensional reform path of institutional innovation, value reshaping, and evaluation revolution to reconstruct the symbiotic relationship between scientific research and clinic with the ontology of Chinese medicine as the foundation and clinical problems as the axis. After continuous development, the future will reach from "paradigm dependence" to "paradigm creation." The ultimate breakthrough in Chinese medicine research lies in the establishment of a methodology system that is compatible with evidence-based thinking; AI pulse diagnostic instrument realizes the objective modeling of "difficult to understand" pulse (accuracy rate of more than 85%), the large model of ancient books increases the efficiency of mining the evidence pattern of the "Clinical Guidelines" by 20 times, and the real-world study (RWS) gradually replaces the RCT to become the mainstream - Chinese medicine will get rid of the "paradigm dependence" to "paradigm creation". Become mainstream - TCM will get rid of the dependence on the Western medical framework, and complete the paradigm shift of evidence-based production empowered by digital technology, from "mechanical superposition" to "gene fusion." In the future, we need to break the physical splicing of "clinical + scientific research" and integrate literature search, data collection, and

statistical analysis into daily clinical practice through “rotational embedded” scientific research training, so that scientific research can become a “second instinct” for clinical decision-making. Second instinct.”

The integrity and innovation of traditional Chinese medicine are calling for a paradigm revolution that is quiet and deep. When master’s degree students can prescribe based on pulse identification and design research based on evidence; when the cross-border application of Gui Zhi Tang is no longer only in ancient texts but in the mapping of multi-omics mechanisms; when TCM treatment plans are both included in the “Clinical Guidelines” and recorded in the international guides - TCM can stand in the world’s medical forests in the modern form that has both humanistic temperature and scientific sharpness. medicine in the world with both humanistic temperature and scientific sharpness. This is the mission given by history to contemporary Chinese medicine practitioners, and it is also the ultimate footnote of the research value of this paper.

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