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Current Status and Challenges in Radiology Education at Traditional Chinese Medicine Colleges

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Abstract

The importance of bridging the gap between traditional Chinese medicine (TCM)'s holistic approach and Western medicine's diagnostic technologies, particularly in the context of medical imaging. In this paper, we discussed the challenges faced by TCM colleges in radiology education in China include philosophical differences, resource constraints, faculty expertise variations, and language and cultural barriers. We advocate for the implementation of multifaceted strategies, such as enhancing the comprehensiveness of the syllabus, optimizing the radiology curriculum, and enriching internship experiences. These measures are designed to elevate the quality of radiology education, enhance student engagement, and improve learning outcomes within TCM colleges.

Keywords: Traditional Chinese Medicine, medical education, radiology

1. Introduction

Traditional Chinese Medicine (TCM) has been practiced for thousands of years, with its roots deeply embedded in Chinese history, philosophy, and culture. It has long been a cornerstone of healthcare in China and has gained popularity worldwide (Matos et al., 2021). The theory of TCM differs fundamentally from that of Western medicine, as TCM is closely intertwined with ancient Chinese philosophies to identify patterns of imbalance of disharmony in the body and to develop a treatment plan to restore balance. TCM encompasses a wide range of practices such as herbal medicine, acupuncture, massage (tui na), exercise (qigong), and dietary therapy, all of which are based on the fundamental principles of balancing yin and yang, the flow of qi, and the interaction of the five elements (Chiang et al., 2012). Recently, TCM has been extensively researched using various modern approaches. It has contributed significantly to the prevention and treatment of human diseases and has become an important part of Alternative and Complementary Medicine or Integrated Medicine (Dobos & Tao, 2011; Wang & Zhang, 2017). The principle of syndrome differentiation treatment followed by TCM is similar to the concept of precision medicine proposed in modern Western medicine. Both approaches reflect the underlying philosophy of personalized medicine, which emphasizes tailoring the diagnosis and treatment to the unique characteristics of individual patients.

Radiology is a medical specialty that uses imaging technology to diagnose and treat various diseases. The field's sophisticated imaging modalities, such as X-ray, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound, offer healthcare professionals a wealth of detailed information about the internal structures and functions of the human body (Manik & Sadigh, 2021) This detailed visual data enables more accurate and timely diagnoses, facilitating the early detection of diseases and personalized treatment plans (Gunderman et al., 2003). The relationship between radiology and TCM is an intriguing and vital area for interdisciplinary research and clinical collaboration. Radiological imaging can offer objective evidence to support TCM diagnoses, which are often based on subtle signs and symptoms, palpation, and the patient's medical history. For example, radiological imaging can help TCM practitioners identify the underlying physical abnormalities or structural changes that may contribute to a patient's symptoms. Conversely, TCM's emphasis of TCM on the interconnectedness of the body's systems can inform the interpretation of radiological findings, leading to a more nuanced understanding of the patient's overall health status. Furthermore, integrating radiology

and TCM can facilitate the validation and advancement of TCM practice. Radiological imaging can be used to objectively measure the physiological changes associated with TCM interventions such as acupuncture or herbal therapy, providing scientific evidence to support the efficacy of these traditional practices.

In China, TCM education typically encompasses comprehensive curricula that cover theoretical foundations, clinical practice, and herbal medicine. Students engage in the study of subjects including acupuncture, moxibustion, TCM theory, diagnostics, and pharmacology, thereby fostering the integration of traditional practices with modern medical knowledge. The duration of education varies, but typically lasts five to seven years for a bachelor's degree, and advanced degrees are available for further specialization. However, current radiology education in traditional Chinese medical colleges faces challenges and potential difficulties, including disparities in curriculum design, resource limitations, faculty expertise variations, and student engagement and acceptance issues.

In this study, we analyze the current status of radiology education in Traditional Chinese Medicine (TCM) schools and discuss the application of innovative educational techniques in radiology to enhance student engagement and improve the quality and effectiveness of teaching.

2. Current Status of Radiology Education in TCM Colleges in China

The integration of radiology education into TCM colleges in China has been a growing area of focus, reflecting the broader trend of combining Western medical technologies with TCM practices. Radiology education in TCM colleges typically aims to provide students with a basic understanding of radiological imaging techniques and their applications in disease diagnosis. This includes knowledge of various imaging modalities, such as X-ray, CT, MRI, and ultrasound, and understanding how to interpret these images in the context of diagnoses.

Although there have been developments in radiology education at TCM colleges, integrating this modern medical technology into TCM education and practice has been fraught with challenges. Some key issues include the following.

2.1 Philosophical and Conceptual Differences

TCM is based on the principles of yin and yang, the five elements, and the concept of qi (vital energy), which is fundamentally different from the Western biomedical model underlying modern radiology. Bridging these philosophical and conceptual differences can be a significant challenge for TCM students and practitioners learning to incorporate radiology into their practice. In addition, curriculum differences remained. TCM education primarily emphasizes holistic symptom-based diagnosis and treatment. Radiology is a technical field that requires in-depth knowledge of anatomy, physiology, and advanced imaging technologies.

2.2 Lack of Standardized Curriculum and Training

Most TCM schools in China lack a standardized radiology curriculum, leading to significant variations in the amount and quality of radiology training across different institutions. This lack of consistency can make it challenging for TCM practitioners to comprehensively understand radiology and its applications. Radiology education in TCM colleges often has insufficient dedicated class hours, which is a barrier to achieving comprehensive learning and mastery of the imaging techniques. Additionally, inadequate comprehension of imaging technology among students poses significant challenges in the instruction of image interpretation and clinical internships. The limited duration of TCM students' rotations in the imaging department hinders their engagement in learning and limits the opportunity for a comprehensive understanding of imaging diagnostic principles. This lack of thorough understanding may impede their readiness for future work in outpatient clinics and inpatient ward.

2.3 Resource Constraints

The extent and quality of radiology education can vary significantly among Chinese TCM colleges. Some institutions may offer more comprehensive programs with practical training and collaboration with radiology departments in modern hospitals, whereas others may provide only basic theoretical knowledge.

2.4 Variability in Faculty Expertise

TCM colleges often need to recruit and train faculty who are knowledgeable about modern radiology techniques. The quality of instruction can vary significantly, as some faculty members may need more specialized training in radiology, impacting the overall educational experience.

2.5 Language and Cultural Barriers

Radiology's technical language and conceptual frameworks are primarily based on the Western biomedical tradition. This can create challenges for students in TCM programs who may require more exposure to these concepts and ways of thinking. The differing epistemological foundations and cultural orientations of TCM and Western medicine can create barriers to communication and collaboration between TCM practitioners and radiologists. TCM's holistic, pattern-based approach to diagnosis and treatment often diverges from disease-centric models underlying standard radiological interpretation and decision-making. Bridging these conceptual gaps and establishing a shared understanding of the complementary strengths of both medical traditions are essential for integrating radiology education into TCM curricula.

3. Strategies to Enhance Radiology Education in TCM Colleges

To effectively address the prevailing challenges associated with radiology education within TCM colleges, it is imperative that these institutions adopt a multifaceted set of strategies. These strategies should encompass the enhancement of curricular frameworks, incorporation of modern technological tools, establishment of collaborative partnerships with radiology departments, and implementation of comprehensive training programs. Such initiatives will not only facilitate a more robust understanding of medical imaging among TCM students, but also ensure that they are well equipped to navigate the complexities of contemporary healthcare environments. By embracing these approaches, TCM colleges can significantly elevate the quality and relevance of radiology education, ultimately contributing to the holistic development of future practitioners.

3.1 A Comprehensive Syllabus for Holistic Clinical Competence

The teaching syllabus for TCM students in the current context should emphasize several key elements. First, it should broaden the horizons of students, enhance their capabilities, and ensure mastery of Western diagnostic methodologies, while also enriching their understanding and utilization of the diagnostic tools inherent to the TCM tradition. Second, the syllabus should strive to seamlessly integrate theoretical knowledge with practical clinical application, focusing strongly on practicality and clinical relevance, and adhering to the principles of concision and essence. Additionally, the syllabus must mandate that students attain proficiency in imaging diagnostic techniques, including comprehension of the appropriate scope of use and indications for such methods, to facilitate their rational application in clinical practice. Students should also demonstrate fluency in interpreting diagnostic imaging reports, familiarity with relevant terminology, and the ability to independently formulate diagnostic opinions based on this knowledge.

These key objectives should be clearly and explicitly delineated within the teaching syllabus to provide students with targeted learning goals to work towards. This approach will guide and focus on their educational journey, ensuring the holistic development of their knowledge and clinical competencies in traditional Chinese medicine.

3.2 Enhancing Radiology Education With Problem-based Learning for TCM Students

An ideal method for teaching radiology is to enhance students' critical thinking, knowledge acquisition, and practical skills and to promote lifelong learning. We introduced a problem-based learning (PBL) method for radiology education for TCM students. Compared to other traditional education methods, the PBL approach can provide several advantages, such as encouraging students to enhance critical thinking, developing effective problem-solving strategies, promoting active and self-directed learning ability, and bridging the gap between theory and practice by allowing students to apply their knowledge to realistic scenarios (Jones, 2006). PBL is particularly well suited to the subspecialization of radiology, as the discipline's design is inherently organized around organ systems, mirroring the structure of PBL problems. This alignment facilitates cohesive and contextually relevant educational experiences for students. A systematic review demonstrated that the PBL teaching model can improve the knowledge and skill scores in Chinese radiology education (Zhang et al., 2018).

3.3 Optimizing Radiology Curriculum in TCM Programs

The allocation of curriculum resources between TCM and Western medicine programs at TCM universities has sparked significant controversy. Insufficient dedicated class hours in radiology education often hinder comprehensive learning and mastery of the imaging techniques. To address the issue of insufficient class hours for imaging disciplines, we have enhanced the curriculum by extending the instructional time. Despite constraints on classroom hours, our pedagogical strategy tackles fundamental concerns and adapts course materials to harmonize students' career paths and educational requirements. Within the comprehensive five-year undergraduate TCM program, a thorough examination of imaging concepts across major human systems was conducted, delving deeply into common diseases characterized by distinctive imaging attributes. Diverse pedagogical approaches have been employed in undergraduate and graduate cohorts. For postgraduate students,

the curriculum intensifies in complexity, fostering self-directed exploration in specialized areas to enhance their research proficiencies. This multifaceted instructional approach is designed to ensure that students not only acquire expertise in imaging, but also to ignite their passion for research and cultivate innovative thinking. By harmonizing fundamental knowledge with advanced inquiry, our objective was to equip TCM students with the skills to thrive in both clinical settings and scholarly endeavors.

Additionally, in the teaching process, it is crucial to emphasize the analysis of the differences and characteristics between TCM and radiology, which could assist students to understanding the two systems more effectively. Acupuncture, for instance, is a traditional empirical medicine with a long history that is a highly practical and operational discipline. It is a compulsory course in TCM colleges. Acupuncture has evolved to be widely used in treating various brain diseases, cervical and lumbar pain, myasthenia, and other conditions, garnering recognition from a broad patient base. Consequently, the integration of acupuncture with Western medical imaging in TCM education should emphasize teaching neuroimaging diagnosis, necessitating that students master the knowledge of neuroimaging diseases.

3.4 Enhancing Radiology Education With Multimedia and Interactive Teaching Tools

The incorporation of multimedia teaching methods is essential in radiology education. These approaches should prioritize curating diverse, high-quality image libraries to assist students in enhancing their visual understanding of various medical conditions. Combining text content with corresponding visual aids is crucial, as it allows learners to intuitively comprehend the material and facilitates easier review. Furthermore, interactive learning platforms such as online discussion forums and social media are leveraged to facilitate communication between students and teachers. These digital tools provide real-time feedback and enable dynamic discussion. For instance, in radiology education, platforms such as WeChat are utilized to augment the learning experience. The integration of these multimedia and interactive elements empowers students to engage more deeply in the subject matter, fostering a richer and more engaging educational journey.

3.5 Enhancing TCM Education Through Radiology Internships

The pivotal role of radiology internships in medical education is undeniable, serving as a bridge between theoretical knowledge and practical application while also nurturing the cultivation of professional ethics among medical students. However, there often needs to be more such opportunities within TCM curricula.

We recognize that all TCM students need a fundamental understanding of medical imaging and its role in diagnosing and treating diseases. When students start their internship in the radiology department, they are given a guided tour of all sections and critical imaging equipment. The assigned instructors explained how the instruments worked, and outlined the main responsibilities of each department. This helps students build a strong foundational understanding and gain practical insights into the capabilities and limitations of various imaging modalities for diagnosing a range of diseases. During the internship, we used a Picture Archiving and Communication System (PACS) to improve student training. The PACS enables students to interact with a broader spectrum of clinical cases and pertinent imaging data, thereby expediting their learning trajectories. Additionally, PACS can integrate with other educational tools, enabling interactive learning experiences, such as virtual simulations and case studies (Towbin et al., 2008). Case-based learning helps students develop critical thinking skills, apply their knowledge to real-world situations, improve collaboration skills, and expand their knowledge through case studies related to the reality of businesses (Sugi et al., 2021).

4. Conclusion

In conclusion, the integration of radiology education within TCM colleges is essential to bridge the gap between traditional practices and modern diagnostic techniques. As medical imaging becomes increasingly vital in patient-care, it is essential for TCM students to acquire a foundational understanding of the radiological principles and applications. Current trends highlight the importance of optimizing syllabi, learning methodologies, hands-on internships, and using advanced technologies such as PACS or social media. These approaches not only enhance critical thinking and practical skills but also foster a collaborative environment conducive to learning. However, challenges remain, including the need for standardized curricula, limited course hours, and limited access to imaging resources. By addressing these challenges and implementing effective strategies, TCM colleges can significantly improve the quality of radiology education, ultimately preparing students to provide comprehensive care that combines the strengths of both traditional and modern medical practice.

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