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The Design and Implementation of a Medical Parasitology Teaching Case Database Based on the Online and Offline Hybrid Teaching Model

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Abstract: The purpose of this paper is to comprehensively develop high-quality medical talents with strong clinical skills and innovativeness. By constructing and applying the medical parasitology teaching case database, students can gain access to various educational tools. The goal is to assist them in their progress from passive to active learning, as well as to develop their autonomous learning ability, critical thinking skills, communication skills, teamwork, and innovation skills. Besides, the goal is also to improve the overall hygiene perspective as well as digest and integrate their knowledge and skills.

Keywords: Medical parasitology; Teaching case; Hybrid teaching; Talent cultivation

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1. Introduction

Medical parasitology is one of the fundamental subjects in clinical medicine. The purpose of learning this subject is to safeguard human health by controlling or eliminating human parasitic diseases caused by pathogenic parasites as well as preventing and treating pathogenic medical arthropods. Although it is easy to learn this subject, students may find it tedious and monotonous, and may even have difficulty remembering what they have learned. As a result, students are prone to becoming frustrated with the learning process [1]. In general, its teaching methods can be delineated as follows: (1) traditional lectures; this method still has advantages in the teaching of parasitology, in which it ensures sufficient time to convey the knowledge in textbooks under the circumstance of reduced class hours; however, this "cramming" teaching style lacks prominent focal points, and the teaching environment does not encourage students' proactivity or involvement during lessons, resulting in a suboptimal teaching effect; (2) multimedia teaching; this approach uses various elements, including pictures and videos, to enrich the classroom and ease teaching, while greatly enhancing students' interest in learning; the modernization of education undoubtedly makes multimedia teaching a suitable approach; however, the massive elements involved in this method have an adverse effect on students' concentration, which is counterproductive to the cultivation of logical thinking skills; (3) case-based learning or situational learning method; this method encourages students to participate actively in class and has a positive educational effect [2]. The National Plan for Medium and Long-Term Education Reform and Development advocates heuristic, inquiry-based, discussion-based, and participatory teaching. Microteaching and group teaching are encouraged to improve students' skills in various aspects, such as in communication and teamwork [3]. At the moment, the medical parasitology course at Wenzhou Medical University mainly implements the "learning-centered" online and

offline hybrid teaching model, involving offline classes conducted via case-based learning.

China's medical education widely applies case-based learning, aiming to bridge theory and practice to achieve rapid knowledge internalization and enhance the skills of students to solve practical problems [2]. The essence of medical case-based learning is to encourage students to read, investigate, think, analyze, communicate, and discuss medical cases in consonance with the educational objectives and requirements. Besides, with the guidance of teachers in case-based learning, this approach enhances students' analytical thinking and problem-solving skills, deepening their knowledge, understanding, and mastery of the subject, thus achieving the educational objectives [4].

However, in Medical Parasitology, this approach requires teachers to continuously expand and strengthen their medical-related knowledge, including diagnostics, pathology, pathophysiology, and other disciplines. Having knowledge about these disciplines facilitates timeliness and accuracy in answering the questions raised by students during case-based learning. Altogether, this approach also prepositions higher requirements for students. First, it requires students to have the courage to accept challenges and progress from passive learning to active learning; it also demands students to demonstrate proactivity and creativity. Second, the case-based learning approach encourages students to read relevant textbooks with the cases and questions in mind, master the basic knowledge of certain parasites, think proactively, and discuss among peers. Through that, students will begin exploring the essence of the concepts and come to the correct diagnosis. The case-based learning approach is student-oriented and based on autonomous learning [5].

In contrast to traditional approaches, many teaching methods are being reformed to become more student-centered, reclaiming the primary role of learning for students. As a result, students will have more control over what they learn and how they learn, and learning will be defined as a self-imposed necessity and responsibility. The primary goal of case-based learning is to develop high-level thinking skills among students, cultivate their ability to analyze and solve practical problems in a comprehensive manner, as well as improve their time management and teamwork. Having teamwork skills, including appreciation and tolerance of heterogeneity among peers, as well as information acquisition and evaluation skills nurtures students to become autonomous learners.

2. Designing a medical parasitology teaching case database

In Medical Parasitology, medical cases should be compiled following the classification of nematodes, trematodes, tapeworms, protozoa, and arthropods. A successful teaching session is predicated on high-quality teaching case contents. Therefore, the compilation and construction of teaching cases should invariably take into account the teaching objectives and syllabus. While selecting and processing cases, it is necessary to connect these teaching cases with the teaching contents, learning objectives, as well as key and difficult contents. In this way, students can better acquire the essential knowledge by discussing relevant teaching cases. Case selection and processing are the most important aspects in the construction of a teaching case database.

2.1. Case selection

The approaches and methods for case selection employ the characteristics and requirements of the aforementioned classification, including the following methods: (1) retrieving from literatures; the diseases caused by parasites or their species names are used as keywords to search for relevant literatures in electronic journal databases, especially case reports, which can be common or atypical; (2) communicating with peers in the education sector; various institutes have mutual exchanges of well-established and mature case resources, thus making case collection more efficient; (3) exploring from the front line; this approach involves visits to clinical or disease control departments to discuss with professionals and access clinical

data or epidemiological investigation reports to obtain actual data; (4) screening suitable cases through WeChat public accounts, such as "I love parasites," etc. Most importantly, the authenticity and knowledgeability of the cases must be ensured regardless of the selection method.

Essentially, the teaching cases are compiled based on actual situations; hence, the cases should be real and feasible, deriving from actual practice. For example, the 2009 outbreak of trichinellosis in Lanping, Yunnan can be characterized as local, communal, and food-borne; the 2006 incident in Beijing where 23 people were infected with *Angiostrongylus cantonensis* after consuming raw snails can be characterized as communal and food-borne; the 2010 deadly tick bite incident killed 18 people in Henan. Through these real-life examples, students will be able to have a better understanding of the dangers of parasitic infections, thus boosting their sense of urgency and consciousness for learning.

Case knowledgeability indicates that the case should incorporate specific knowledge that allows students to learn and draw lessons from it. For example, what is the cause in the 2008 case where an old man was paralyzed and incontinent after consuming undercooked pork? Through this learning experience, students will learn about the morphological structure and life cycle of *Taenia solium* to treat the disease, understand its prevention, as well as summarize lessons and experiences from it. These cases serve to stimulate students' thought process. The specificity reflects the consistency of these cases with the teaching contents. Students' interest in learning will be promoted when they enjoy the lessons. Practicality means that the cases selected are consistent with the students' career plans and job requirements; hence, cases should also be instructional for their future careers.

2.2. Case processing and organization

Commonly, there is a gap between the selected cases and the actual use in teaching. In particular, the raw materials retrieved from literatures and front-line investigations are unprocessed, and they lack the attributes required for case teaching. Therefore, the materials should be well processed and modified for teaching. Based on the comprehensibility of the original materials, the authenticity of the case should be maintained, and the key points should be drawn to a conclusion after eliminating trivial details. Numbers and data should be turned into suspenseful stories with plenty of clues.

Moreover, the language used should be polished to create an exciting and urgent environment, immersing students into the reality recreated by words, prompting them to think, eliciting their emotions, and piquing their interest. Newly introduced cases need to be sculptured through practice. Biases and deficiencies can be detected during implementation based on the teaching effect, and cases should be regularly evaluated and amended to present high-quality cases with strong feasibility.

3. Implementing the teaching case database

The specific implementation process of discussing offline cases and carrying out activities in teaching practice is discussed in this section.

3.1. Case presented prior to the class along with questions designed based on the case

In a class, the students can form groups of five with one elected group leader in each group. The leader takes charge of organizing case discussions, case analysis, and reports defenses. The case materials can be distributed to the students through the provincial online platform one week before the case discussion. The students will then be required to read the materials carefully, consult the designated materials and readings based on the questions designed, preview the learning objectives, as well as prepare for problem analyzing and solving.

3.2. In-class case discussions and lectures

The teacher will first review the case and then request the groups to present during class. The group leader will discuss the answers to the questions through a PowerPoint presentation. Group members can collaborate and supplement their group's presentation. Thereafter, the case study report and presentation slides from each group are collected for grading, in which the grades are included in the final grade for each group member. Teachers should encourage students to be active participants by encouraging them to take the initiative to participate in the case discussion. Meanwhile, teachers should also pay attention to the class progress and provide appropriate guidance to enable students to illustrate the learning objectives that require mastering. Teachers should guide and answer any disputes or misunderstandings pertaining to the questions during the discussion.

3.3. Case evaluation and summary

From the case report of each group, the teacher will comment on the analysis and discussion process, as well as the result of each group, praising the positive aspects and pointing out the shortcomings for improvement. Subsequently, the teacher will summarize the case, examine the thought process and steps, as well as announce the case study results. If necessary, the teacher will provide supplementary explanations for certain learning objectives, in which the emphasis is on the key and difficult points in the lesson, in order to assist students in consolidating and deepening their understanding.

4. Conclusion

In this work, a standardized, practical teaching scenario of medical parasitology discussion is designed, arranged, and implemented at Wenzhou Medical University to improve the teaching quality and promote the overall effectiveness of this education. This effort also strengthens the awareness of service providers, standardizes the teaching style, and develops an efficient learning style to create a positive teaching and learning environment for both, teachers and students at Wenzhou Medical University. The accomplishments achieved under this project, which should be popularized, will provide reference and guidance for the training of medical students at medical universities across China and those around the world.

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Disclosure statement

The authors declare no conflict of interest.

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