

Exploration of Teaching Styles in a Digestive System Integration Course

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Abstract: *Purpose:* To explore the innovation of teaching methods in digestive system courses and its application effect in the context of curriculum integration. *Methods:* 60 undergraduate majors of digestive system diseases in the class of 2023 (orientation) of our hospital were divided into 30 students each in the general class and the experimental class using the random grouping method. The general class adopted the case-based learning (CBL) teaching mode, and the experimental class adopted the integrated course mode of CBL + “organ-systems-based curriculum” (OSBC). The teaching effects of the two classes were compared through basic theory and clinical five-station examination. *Results:* The differences in the basic theory scores and excellence rates of the students in the experimental class were significant ($P < 0.05$); the clinical 5-station examination suggested that there was no statistical significance in the physical examination of the two classes ($P > 0.05$); and the differences in the scores of the clinical questioning, case writing, auxiliary examination, and oral examination of the two classes were statistically significant ($P < 0.05$). *Conclusion:* The teaching method based on CBL + OSBC integrated course is effective in the teaching reform of the digestive system course and has popularization value.

Keywords: Digestive diseases; Case-based learning teaching model; Organ-systems-based curriculum teaching model; Educational reform; Clinical teaching

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1. Introduction

In the cultivation of higher medical talents in China, the “discipline-centered” three-stage teaching mode, i.e., public basic education, basic medical education, and clinical medical education, has been used for many years. However, with the development of the times and the constant change of medical knowledge, the existing education mode is obviously not adapted to the needs of the development of the new society. Therefore, it is urgent to learn from the advanced medical education reform experiences of foreign countries to realize the innovation of China’s medical education mode^[1]. Case-based learning (CBL) teaching model is a group discussion teaching method based on clinical cases, designing teaching problems related to them and guiding students to develop skills around the problems, which has now become one of the main methods of medical education in China. The “organ-systems-based curriculum” (OSBC) teaching concept was put forward by the School of Medicine of the University of the United States in 1952, aiming to break the “discipline-centered”

teaching mode and implement the organ-system-based curriculum reform, the core of which is to construct teaching content and promote curriculum integration by focusing on organs and systems, emphasizing the coherence between basic and clinical medical education curricula, and thus strengthening the comprehensive thinking training of clinical medical students [2]. Since September 2016, our institution has tried to carry out curriculum reform with the concept of OSBC and CBL integration in the five-year undergraduate clinical medicine program, hoping to promote the comprehensive ability of students by reconstructing the teaching system, planning the teaching content, innovating the teaching methods, and continuously improving the construction of the assessment system. This study takes the digestive system integration course as an example to explore the effectiveness of the CBL teaching method in the clinical teaching of digestive system diseases in OSBC, aiming to further improve the development of our medical students' education and training system and enhance the quality of teaching and learning in clinical medical education.

2. Information and methods

2.1. Subject information

60 undergraduate students majoring in gastrointestinal diseases in the class of 2023 (orientation) of our hospital were divided into an experimental class of 30 and a general class of 30 according to the random number table method. There was no significant difference ($P > 0.05$) in the comparison of the general information of the two classes, such as the age of enrollment (17–19 years old), college entrance examination results (all of them reached the score line of the undergraduate batch), college entrance examination source, learning environment, psychological quality, and so on, and they were comparable.

2.2. Teaching methods

The general class adopted the CBL teaching mode. Representative cases of digestive system diseases, such as gastritis, gastric ulcer, liver cirrhosis, etc., were selected as teaching materials, and by guiding students to analyze, discuss, and solve problems, students' interest in learning was stimulated and their clinical practice skills were improved. During the teaching process, the teacher guided the students to analyze the cases comprehensively, including the etiology, pathophysiological process, diagnosis, and treatment methods of the diseases, so that the students could combine the theoretical knowledge with the clinical practice organically, and deepen their understanding of the theory and clinical practice of the course.

In the experimental class, an integrated curriculum model of CBL + OSBC was used. Implementation method:

- (1) Organ-systems-based curriculum integration: Teachers changed the previous “discipline-centered” mode of setting up individual disciplines, and integrated the curriculum system of internal medicine, external medicine, and other related system knowledge areas. Integration tasks were shared by the system, and each system organically integrated the teaching content, reorganized the course content, wrote relevant clinical cases, connected the internal medicine and surgery knowledge points with the case as the center, deleted the redundant and repetitive content, and added new advances and guidelines.
- (2) Implementation of modularized teaching of digestive system theory and practice: Five weeks after the start of the course integration, 30 hours in the digestive system were selected for the implementation of theory-practice modular teaching. During the teaching process, teachers guided students to analyze the cases comprehensively, including the etiology of the disease, pathophysiological process, diagnosis, and treatment methods, etc., so as to enable students to organically combine theoretical knowledge with clinical practice, and deepen their understanding of the theory and clinical practice of the course.

2.3. Evaluation of teaching and learning

(1) Theoretical examinations

After completing the course, the students were assessed according to the comprehensive course “centered on the organ system,” and on this basis, the questions were prepared by the digestive department teaching team and the papers were marked uniformly. The score of 85 or more than 85 was given to the students with the number of invigilators and the number of teachers remaining unchanged.

(2) Clinical 5-station examination

At the end of the comprehensive subject test, the two classes carried out the “5-part” gastroenterology clinical competence test, that is, “questioning,” “physical examination,” “medical record writing,” “auxiliary examination,” and “oral examination” parts; each of which was worth 20 points making a total of 100 points.

2.4. Statistical methods

The data statistics were processed by SPSS23.0, and the measurement information was expressed as mean \pm standard deviation (SD), and the comparison between groups was performed by independent samples *t*-test; the comparison of excellence rate (%) was performed by χ^2 test, and the difference was considered to be statistically significant at $P < 0.05$.

3. Results

3.1. Comparison of basic theory scores

The scores and excellence rates of the basic theory examination of the students in the experimental class were higher than those of the general class ($P < 0.05$), as shown in **Table 1**.

Table 1. Basic theory exam results and excellence rates

Evaluation projects	Experimental classes (n = 30)	General classes (n = 30)	<i>t</i> value	χ^2 value	<i>P</i> value
Basic theory (points)	86.26 \pm 5.24	81.04 \pm 6.13	3.5454	-	0.0008
Excellence rate [n (%)]	25 (93.33)	14 (46.67)	-	8.8645	0.0029

3.2. Clinical 5-station examination

The results suggested that there was no difference in the performance of the physical examination between the two classes ($P > 0.05$); the experimental class was significantly better than the general class in the four stations of examination, including questioning, medical record writing, auxiliary examination, and oral examination ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of clinical 5-station examination scores

Evaluation projects	Experimental classes (n = 30)	General classes (n = 30)	<i>t</i> value	<i>P</i> value
Medical record writing	90.36 \pm 2.25	80.45 \pm 1.68	19.3302	0.0000
Auxiliary checkup	93.45 \pm 3.31	84.02 \pm 3.37	10.9344	0.0000
Physical examination	89.53 \pm 5.32	87.51 \pm 5.34	1.4678	0.1476
Questioning	87.65 \pm 4.75	74.69 \pm 4.67	10.6565	0.0000
Oral examination	93.23 \pm 2.12	79.92 \pm 3.01	19.8014	0.0000

4. Discussion

4.1. Current status of the OSBC educational reform of the digestive system

In medical education, organ-systems-based curriculum teaching reform is gradually gaining attention, which aims to break down the disciplinary barriers of traditional medical education and organize the teaching content in a systematic way, so that students can have a more comprehensive understanding of the structure and function of the various organ systems of the human body, as well as the interconnections between them ^[3].

Traditional medical education is organized according to disciplines, which leads to the fact that students need to master the knowledge points of different disciplines in the learning process, and it is difficult to form a systematic knowledge system. The organ-systems-based curriculum teaching reform can integrate the knowledge points of different disciplines and systematically organize the teaching content so that students can better understand and master medical knowledge. Traditional medical education often focuses on the teaching of theoretical knowledge and neglects students' clinical practice skills. The organ-systems-based curriculum teaching reform allows students to practice in a simulated clinical environment, better master clinical skills, and improve clinical practice skills ^[4]. Traditional medical education lacks cooperation and communication between teachers due to the barriers between disciplines. In contrast, organ-systems-based curriculum teaching reform requires teachers from different disciplines to work together to organize teaching content and teaching plans, thus promoting cooperation and communication among teachers.

The results of this study showed that the score of the basic theory examination of digestive system diseases in the experimental class (86.26 ± 5.24) was higher than that of the general class; the rate of excellent performance (93.33%) was higher than that of the general class (46.67%) ($P < 0.05$); in the 5-station examination, except for the difference between the two classes of the physical examination which was not statistically significant, the experimental class was better than the general class in the areas of questioning, medical record writing, auxiliary examination, and oral examination ($P < 0.05$). A comparative study found that the application of CBL teaching method in undergraduate clinical teaching of digestive diseases has the following advantages:

- (1) Guiding students to learn and think independently through real clinical cases, stimulating students' interest and enthusiasm for learning, and improving students' learning effects;
- (2) Using cases as clues to guide students to analyze and discuss cases, and organically combining theoretical knowledge with clinical practice, thereby cultivating students' clinical thinking and ability to solve practical problems;
- (3) Through group discussions, student can learn and think independently, exchange opinions and experiences with each other, thereby improving their comprehensive quality and teamwork;
- (4) Students in experimental classes who apply the CBL teaching method have better scores in theoretical examinations and practical skills assessments than students in the general classes. Students said that the CBL teaching method made them more proactive in the learning process and deepened their understanding and knowledge of digestive system diseases.

CBL teaching method in the organ-systems-based curriculum teaching reform of digestive system diseases emphasizes students' active participation and cooperative learning and improves their clinical thinking and practical skills by guiding them to solve practical problems. Specifically, the CBL + OSBC integrated curriculum teaching mode has the following significant advantages:

- (1) Improving students' clinical thinking skills: By introducing real cases, students are guided to analyze and discuss, helping them better understand the occurrence and development process of the disease and improve their clinical thinking skills ^[5].

- (2) Enhancing students' practical skills: In teaching practice, students need to simulate the diagnosis and treatment process in the clinical environment and master clinical skills through personal practice, which can help students better master various diagnosis and treatment skills and improve their practical skills.
- (3) Improving students' independent learning: During the learning process, students need to find information, analyze, and think on their own, and solve problems through independent learning. This learning method can help students develop the habit of independent learning and improve their independent learning ability. At the same time, this teaching method can also help students better understand the etiology, pathology, and clinical manifestations of digestive system diseases, and improve their interest in learning.

4.2. Problems and prospects

Although the integration of teaching and learning in the digestive system curriculum is imperative, the challenges faced in its implementation should not be overlooked.

- (1) The integration of some knowledge points is not in-depth, and it is only a simple splicing of knowledge from different disciplines rather than in-depth integration. For example, in the process of clinical internship, due to time constraints, students can only learn the knowledge of some diseases, resulting in a lack of learning comprehensiveness.
- (2) Although clinical teachers from multiple departments are involved in teaching the integrated curriculum, the limitations of their teaching skills and knowledge level may affect the systematic nature of the curriculum ^[6].

To address these problems, first of all, it is necessary to strengthen the professional training of the faculty team to improve their teaching skills and knowledge level, especially in teaching aspects such as CBL. We can try to introduce more real cases into the teaching process to make the teaching content richer and more realistic; at the same time, we can combine with other teaching methods and technologies to form a diversified teaching mode to better meet the learning needs of students. For example, combining CBL teaching method with PBL teaching method can bring the advantages of the two teaching methods and improve the teaching effect. Secondly, well-known experts in the field of the digestive system are invited to give lectures every semester, and team teaching and research activities are held regularly, so that teachers of various disciplines can discuss how to realize the articulation of content among different disciplines. This interdisciplinary collaboration is utilized to promote deeper integration of teaching content in order to provide a richer and more meaningful teaching experience. In addition, teachers should actively participate in thematic training and teaching competitions inside and outside the institution and the university in order to master and apply various teaching applications (e.g., Rain Classroom, Blue Ink Cloud Class, Learning Pass, etc.) and build a blended teaching model that combines both online and offline so as to ensure that teaching is student-centered and more focused on active learning and participation of students. At the student level, teachers need to focus on intrinsic reflection on their own teaching ability. For example, using the statistical function of the SPOC platform, to understand the performance of students in the learning process from a group perspective, including knowledge mastery before the class, the absorption and application of new knowledge during the class, and the completion of homework after the class; from an individual point of view, to provide individual guidance to individual students to implement tailored teaching with the aim of improving the overall quality of teaching and learning to ensure that each student learns and progresses in a way that suits them. Curriculum integration is a complex process. If integration only remains on the surface without focusing on the in-depth integration

of knowledge, the real purpose of integrating the curriculum cannot be achieved. Teachers also need to sum up their experiences in the process of continuous practice and innovation, and make adequate preparations in terms of teaching concepts, teaching conditions, organizational structures as well as teachers' qualifications. Through such efforts, the integrated mode of teaching will be able to better meet the needs of modern education and provide students with a more comprehensive and in-depth learning experience.

5. Conclusion

In summary, the CBL-based OSBC integrated curriculum model has significant advantages in undergraduate clinical teaching of digestive diseases, which not only leads to a significant improvement in students' academic performance but also enhances students' interest in learning and independent learning. Thus, it is recommended to be widely used in undergraduate clinical teaching of digestive diseases.

Disclosure statement

The authors declare no conflict of interest.

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