



Research Article

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Effects of CBL mode to residency training doctor of pediatric dentistry for making diagnosis and treatment plan

Limin Wei, Jianfeng Ma, Yihuai Pan and Jianfeng Wang*

School and Hospital of Stomatology, Wenzhou Medical University, Wenzhou, China

ABSTRACT

To evaluate the effect of CBL mode to making diagnosis and treatment plan for resident doctor who were being trained for pediatric dentistry. Methods: With Completely randomized way, 54 resident doctors were divided into two groups, which were taught with CBL mode and traditional teaching mode separately. Examination paper test and questionnaire survey were accomplished after the teaching. Research Data were analyzed with t-test and χ^2 -test. Results: There were no significant difference between two groups of students' examination pass rate. Scores, diagnostic accuracy and rationality of treatment plan of the experimental group were higher than that of control group, $P < 0.05$. The questionnaire showed that CBL mode was positively evaluated by students of experimental group, but at the same time, it also increased the burden of course learning. Only 55.56% students in questionnaire survey thought the CBL mode was helpful to improve theoretical examination performance. This proportion was not ideal and needed be improved in the future. Conclusions: CBL teaching is advantageous to increase the diagnostic accuracy and rationality of treatment plan, and improve the students' competency of case analysis. CBL mode should be selectively applied in the teaching process, and combined with the actual situation of students. Meanwhile, its limitations need to be recognized, which can avoid increasing the students burden overly and reduce the students' interest in learning.

Keywords: Pediatric dentistry; Case based learning; Treatment plans

INTRODUCTION

Recently, Case based learning (CBL) is widely used in dental education [1]. Compared with the traditional teaching mode in classroom, CBL mode can greatly enhance the initiative of students to acquire knowledge, provide a good clinical simulation environment and widen their knowledge and cultivate creative ability, and so on. More and more educator are strongly advocated to use CBL mode in dental education. However, some scholars think, there was no sufficient evidence to verify CBL mode can improve the clinical ability of students, meanwhile, its teaching methods is complex, time-consuming, and its requirements for teaching design and teacher are higher than that of traditional teaching mode, which limits the CBL application in practical teaching widely [2]. Pediatric dentistry is higher requirements to clinical practice. during the undergraduate stage, students only master some basic theory and is lack of clinical practice. An in-depth clinical practice will be in the residency training stage. A lot of studies found that CBL mode did help to speed up the students to adapt to clinical operation, increased diagnostic accuracy and rationality of treatment plan. But the problems in the process of CBL mode also did not allow to be ignored. This study is to analyze the relationship between CBL mode and its effect, discusses its effectiveness in the process of resident specialist training.

EXPERIMENTAL SECTION

THE RESEARCH OBJECT

54 resident doctors of Wenzhou Medical University, who took part in standardized training process of pediatric

dentistry, were chosen and divided into two groups with completely random way. Experimental group: CBL mode; Control group: traditional teaching mode, there were 27 students in each group.

THE RESEARCH METHODS

One week before the begin of the course, the data of 6 related clinical case were sent to all resident doctors, which included the patient's clinical examination results, model, photos inside the mouth. Students were given a series of questions about diagnosis and etiological analysis, also required to put forward corresponding treatment plan.

Control group: Teachers explained the basic knowledge of this chapter, and illustrated how to analyze cases. After each group of students answered the question in-class, teacher announced the right answers and made detailed records about the accuracy of student's answers.

Experimental group: Teachers provided students with reference lists, and guidance on how to use search tools, such as the use of campus network of digital library, to found required information, consulting reference books or literature. Students cooperated to find relevant informations and discuss all the problems beside class time. Then, randomly chosen student illustrated mutual discussion results, including the diagnosis, etiological analysis, treatment plan, prognosis inference, and so on. After other students complement freely in class. Later, the teacher summarized and evaluated students' representation.

Examination paper test and questionnaire survey were accomplished after the teaching [3]. Rationality of treatment plan was assessed by the same professor based on relevant principles of clinical treatment. Students of experimental group were surveyed with questionnaire. All of 54 questionnaires were valid after Examined.

STATISTICAL ANALYSIS

Statistical analysis was done with SPSS 13.0, significance level $\alpha=0.05$. Two sample mean comparison of hypothesis test (*t*-test) was used to analyze the scores of exam. χ^2 -test was used to analyze the other data.

RESULTS

Two group of scores, examination pass rate, diagnostic accuracy, rationality of treatment plan were showed in table 1. The results of questionnaire survey were showed in table 2.

Table 1 The statistical analysis of examination paper [n=27, n(%)]

Study item	Experimental group	Control group	<i>t</i> / <i>F</i>	<i>P</i>
Scores ¹	88.61±8.34	76.13±8.59	5.7879	0.0000
Examination pass rate ²	26 (96.30)	24 (92.59)	0.2700	0.6033
Diagnostic accuracy ³	24 (88.89)	18 (66.67)	3.8571	0.0495
Rationality of treatment plan ³	22 (81.48)	15 (55.56)	4.2067	0.0403

¹ Data analyzed with *t*-test, *P* < 0.05

² Data analyzed with χ^2 -test (Yates' correction), *P* < 0.05

³ Data analyzed with χ^2 -test (Pearson' non-correction), *P* < 0.05

Table 2 Evaluation about CBL mode by students of experimental group [n=27, n(%)]

Survey item	Positive	Negative
Strengthen self-study ability	26 (96.30)	1 (3.70)
Improve the theory examination results	15 (55.56)	12 (44.44)
Cultivate the ability of collaboration	18 (66.67)	9 (33.33)
Increase the burden course learning	20 (74.07)	7 (25.93)
Improve the ability of analysis problem	22 (81.48)	5 (18.52)
Shorten the clinical work of adoption	19 (70.37)	8 (29.63)

DISCUSSION

Oral medicine is an experience-based discipline, in which it is important to accumulate a lot of repeated cases to develop the ability for accurate diagnosis and treatment. Owing to the limitation of learning time and lack of patients, it is very difficult to achieve good effect and goal.

Due to the influence long-term traditional teaching, passive acceptance of knowledge has become the main way of student when they learned pediatric dentistry [4]. If teacher simply imparted knowledge into students, the difficult of learning in the classroom through the traditional method would increased markedly. In the meantime, the ability of combining theoretical knowledge and clinical practice would reduced. the ability of using it to analyze cases

would reduced too. During the process of CBL mode, both teacher and students could participate in the same time. They also could help and inspire each other among students, which effectively reduced study requirement. Plentiful opportunities of discussion and thinking in the classroom and improved student ability to analyze cases [5]. In addition, mutual discussion about cases in the classroom could not only create a positive learning environment, but also laid the foundation for an online interactive learning after school. However, there were some disadvantages in cases discussion, such as lower efficiency, take more time, which could indirectly affect explanation of theoretical knowledge. Therefore, further research was needed to find out a poised point about how to allocate rational time between elaborating theoretical knowledge and discussing curriculum-related cases.

CBL are popular teaching models worldwide that have become one of the important parts in teaching reforms to promote medical education quality. However, the CBL teaching model is often attached to the courses of subjects, aiming at enlightening the students to explore, find, and solve problems and enhancing speculative ability. The subjects involved in CBL are students who have finished their fundamental medical courses. We carried out CBL teaching in English in clinical stomatological courses and investigated its application effect in this study.

Besides basic clinical knowledge, extensive knowledge (such as new development of oral medicine and humanistic quality requirement of dentists) is also required in the practice of CBL teaching in English applied by College of Stomatology, Shanghai Jiao Tong University. These courses expand students' professional foreign language vocabulary, improve their ability to express themselves, enhance their clinical thinking ability, and raise their awareness of and ability to accept new professional knowledge. By elaborating on and analyzing cases, students gain more skills concerning the initial and subsequent visits and learn steps and key points of inquiry, physical examination, auxiliary examination, differential diagnosis, and treatment plan.

Pediatric dentistry is higher requirements to clinical practice. For resident doctors who have never exposed to specialized clinical practice, knowledge of pediatric dentistry was very abstract, and not easy to understand. In the clinic, the symptoms of the children's dental disease was complicated, and each patient's growth situation is also different, so that, its treatment plan, process and prognosis were accordingly different. As a result, students felt more difficult to flexibly apply what they have learned theoretical knowledge. As shown in table 1, after the teaching, two groups of students had a better understanding and grasp on children's dental disease, diagnostic accuracy reached the expected goal. But the students of experimental group showed a better flexibility. The degree of mastering the knowledge (scores and examination pass rate), degree of using the knowledge (the diagnostic accuracy and rationality of the treatment plan) were significantly higher than that of control group, and the difference was statistically significant between two groups. The results suggested that the CBL mode could provide students with clinical more close to the real scene, motivate students' learning interest, therefore, this mode had obvious advantages in making treatment plan [6, 7]. Application of CBL could effectively cultivate students' quality of establishing reasonable treatment plan, improve the students' ability to analyze and solve clinical problems. In addition, It was also beneficial to Help students combining theoretical knowledge and clinical practice before the clinical stage.

Students had to focus on how to improve their scores underneath the traditional exam-oriented education. Some students were worried that they might not gain a good score in the examination, even though they spend a lot of time and effort on CBL mode. Therefore, before CBL mode started, it was necessary for the student to carry on the simple training and let them realize that CBL mode could doubtlessly cultivate students better autonomous learning ability, and deepen learning and mastering skill. The results in table 1 also showed that the application of CBL mode obviously improved the student's scores and examination pass rate. Compared with conventional teaching, these methods make students feel more interested, less pressured, and more efficient, while standardized patients and computer-simulated persons have a relatively higher cost and manpower cost.

Memory of knowledge in the classroom was affected not only by instant memory ability, but also the review efficiency after class. on consolidating the knowledge, the effect of CBL mode way was more effective than the arrangement of the passive one-way teaching task. CBL mode part of interactive teaching method provided a good communication platform between teachers and students, which changes the passive learning into active learning. Observed in the classroom and CBL mode, this study found that, silence negative student in the other major course often behave more active in pediatric dentistry. Flexible use of case discussion and CBL mode teaching method in the classroom could break through the limitation of the classroom teaching, improve the learning interest.

Questionnaire survey (table 2) showed, 96.30% students thought that CBL mode could strengthen the students' self-study ability. All the students in the process of learning were able to make full use of network, learning resources such as reference to find out the information what they needed, which was beneficial for the students to master the effective learning method and cultivate the self-learning ability. However, the CBL mode teaching also

had its disadvantages. Firstly, the CBL mode process was done in student's spare time, the teacher could not ensure that every student participated in the same degree exactly. Secondly, some students may cope with it negatively, which caused that their ability of thinking independently did not exercise properly, even cultivated the habit of laziness and plagiarism.

CBL teaching is a step by step process. The first step is to master the professional words and general information. Students search the information themselves help them to understand the words and professional information. The second step is small group discussion. Students are asked to use professional words to express their viewpoints. It is helpful for students to thinking and to analysis. The third step is class discussion. In this step the questions are discussed deeply. These step by step process help students to understand the teaching contents easily. It is a active process.

Only 55.56% students thought that CBL mode were advantageous to improve their examination performance. However, this proportion was not ideal and needed be improved in the future. 66.67% students thought that CBL mode could cultivate the ability of division and cooperation of labor. 81.48% students thought that, based on typical clinical cases, CBL mode could guide students to comprehensively analysis pathogenesis, symptom, diagnosis and treatment plan and prognosis. From this, the students could have more comprehensive and in-depth understanding of disease. 70.37% students thought that CBL mode were advantageous to combine theoretical knowledge and clinical practical application, so that students would complete the transformation from medical student to doctor, and clinical adaptive phase was shorten obviously. But, there were still 74.07% students thought that, although CBL mode could give students sufficient preparation before class time, deepen the understanding of learning content and key problems, CBL mode needed to spend a lot of time and energy to retrieve plentiful references and further sort them, prepare discussion, make courseware, and so on. Found in the teaching process, less burden increase could improve their study interest, aroused their enthusiasm and initiative, but excessive burden resulted in the opposite effect.

In the teaching practice, we realize that CBL—including knowledge management, human management, and relationship management (which are three-dimensional cooperative relationships, including the dominant relationships between teachers and students, among students, and between virtual reality patient and doctor)—is different from traditional educational resource management processes. Instead of playing a role of communicator of information, teachers become a critical guide, while students grow into positive thinkers rather than acquire information passively. Because of the shift from attention to knowledge itself to focus on methodology, both teachers and students can exert their abilities, which actually achieve the effective management of teaching how to do it. Therefore, CBL realizes another important teaching goal: effective management of various relationships in this process, which can form an effective incentive to both teachers and students. Thus, the present study is useful for students and teachers.

Although long-term effects were not assessed, CBL was found to generate students' learning enthusiasm, promote and train thinking, and integrate and manage teaching resources effectively. From this investigation, we conclude that CBL is worthy of wide use for resident doctor who was be training for pediatric dentistry. However, the barriers to CBL popularization are as follows: the high request for teachers' skills and high-quality teaching team for cooperative work, readjustments in teaching hours and quantitative assessments for students and teachers; and the requirement of a complex and long-term adapting period. Therefore, attention should be paid to these questions in the application of CBL.

In summary, CBL mode has a good theoretical basis, is more and more widely applied at dental education [8-10]. It is important to note that CBL mode has been a main position in the long-term. If major changes of teaching method in a short period could bring a bad influence on normal teaching. But should be combined with the actual situation of students, purposeful, selectively applied CBL mode, fully understand its limits, avoid to cause the students learning burden, reduce the students' interest in learning. CBL mode should be selectively applied in the teaching process, and combined with the actual situation of students. Meanwhile, its limitations need to be recognized, which can avoid increasing the students burden overly and reduce the students' interest in learning.

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