

# The Practice of Case Three-dimensional Teaching Method in Probation Teaching of Otorhinolaryngology Department Among Eight-year Medical Students

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## Abstract

This paper aims to discuss the application and effect of case three-dimensional teaching method (CTTM) in probation teaching of the Otorhinolaryngology Department among eight-year medical students. The effect of the CTTM and the case-based learning (CBL) on the probation practice of the Otorhinolaryngology Department was compared. The students were randomly divided into experimental group and control group. After probation, the examination and the questionnaire were used to evaluate the teaching effect. As a result, the performance, total score and results of medical record analysis among the two groups were statistically significant ( $P < 0.05$ ). The questionnaire showed that the satisfaction rate of the students about the CTTM was 90.5%; in the aspects of the improvement of learning interest, the clinical thinking ability, the exploration and innovation ability, the case analysis and understanding ability, the improvement of the academic performance, the probation information amount, the systematicness of typical diseases, the decrease of learning burden and the like, the CTTM group was superior to the CBL group. In addition, the questionnaire showed that the proportion of the students who were willing to work in the otorhinolaryngology work or to register the postgraduates of the otorhinolaryngology was also significantly improved in the CTTM group. In conclusion, CTTM adapts to the development trend of modern medical teaching and focuses on the cultivation of eight-year medical students' learning interest, good clinical thinking and exploration and innovation ability, which is a good probation teaching mode of Otorhinolaryngology Department.

**Keywords** Otorhinolaryngology; Probation teaching; Case three-dimensional teaching method; Questionnaire

## 1. Introduction

Clinical probation is an initial stage of cultivating the clinical ability of medical students, which is of great significance. As a new learning field, clinical probation has significantly different learning environment, ways and methods from the previous medical theory. In this stage, through inquiry, observation, thinking, analysis, operation and other clinical practice activities, the students combine the learned medical knowledge with clinical practice organically, so as to achieve the purpose of transforming medical theoretical knowledge into clinical ability.

The Otolaryngology Department of the First Affiliated Hospital, Sun Yat-sen University is the national key discipline of the Ministry of Education and the key clinical specialty of the Ministry of Health and the main probation base of Otorhinolaryngology Department for eight-year medical students in Sun Yat-sen University. The existing problems in clinical probation teaching were presented as follows <sup>[1]</sup>:

(1) The teaching content of the otorhinolaryngology was extensive, the time of the probation was less, and the students easily gained a superficial understanding through cursory observation with low learning interest, low efficiency and poor effect of probation.

(2) Case-based learning (CBL) has been implemented for many years. The eight-year medical students who entered the clinical probation for the first time were difficult to obtain the ability of analyzing the clinical case very quickly due to little clinical practice experience. In the CBL process, given that the students might not speak actively, their clinical thinking was disconnected from the probation practice, the eight-year medical students' most important ability of clinical thinking and exploring innovation could not be improved. At the same time, the students' burden was heavy because they needed to devote a lot of time to review before the examination.

In view of the above problems, it is necessary to reform the probation method of the Otorhinolaryngology Department. In recent years, with the development of information network technology, some advanced teaching methods emerge, such as the multimedia-assisted teaching method, the three-dimensional teaching method and the case three-dimensional teaching method (CTTM) and the like. CTTM was a new teaching method combining case teaching with three-dimensional teaching and multimedia-assisted teaching, which had been successfully applied to the teaching of many clinical disciplines <sup>[2, 3]</sup> with good teaching effect. The application of this teaching method may solve the problems existing in the probation teaching of the Otorhinolaryngology Department. This study was designed to observe the practical effect of CTTM in the probation of the Otorhinolaryngology Department for eight-year medical students, and to carry out a preliminary evaluation of its teaching effect by means of control and questionnaire.

## 2. Data and methods

### 2.1 Subjects

10 groups of eight-year clinical probationers of Grade 2014 from Sun Yat-sen University with 7~9 persons in each group were selected as subjects for 1 week of probation in the Otorhinolaryngology Department, and were randomly divided into experimental group and control group according to the random number table. The Department arranged senior deputy chief physician for off-job teaching.

## 2.2 Teaching methods

### 2.2.1 The control group adopted CBL.

(1) The teacher introduced cases by the bedside and presented the images and test results. (2) After the presentation of clinical cases, 2-3 questions were put forward. Each probationer was required to consult the teaching materials and literature for the questions. (3) After the above questions were answered by 3-4 probations during case discussion, the teacher guided the students to think and analyze the problems according to the specific situation of the answers.

### 2.2.2 The experimental group adopted CTTM.

(1) Typical clinical cases were provided before probation, and the probationers were required to log in Sun Yat-sen University network to enter the excellent course system for online learning. (2) The teacher prepared lessons and presented the characteristics of typical cases stereoscopically and multidimensionally using video, audio-visual, multimedia teaching and other teaching means. (3) The teacher introduced typical disease cases by the bedside. (4) According to the collected medical records, the teacher used multimedia courseware with pictures and videos and the like to systematically present anatomy, pathology, symptoms, signs and auxiliary examinations (CT, MRI, etc.) of typical diseases, had question-and-answer discussions with students, analyzed clinical diagnosis and treatment of diseases, discussed diagnosis of common diseases and differential diagnosis, and carried out individualized treatment of diseases. (5) Combined with diagnosis and treatment of cases, the teacher put forward outstanding problems, introduced the latest research trends and hotspots, stimulated students' interest in clinical research, and cultivated the exploration and innovation ability of students.

## 2.3 Evaluation indicators

### 2.3.1 Examination performance

The examination was taken after the end of probation.

### 2.3.2 Questionnaire

After the examination, the anonymous questionnaire was carried out to evaluate the teaching content and effect. The items of questionnaire included: learning interest, clinical thinking ability, exploration and innovation ability, analysis ability of clinical cases, improvement of academic performance, improvement of self-learning ability, information amount of probation teaching, mastering of theoretical knowledge, systematicness of typical diseases, decrease of learning burden, and satisfaction of teaching methods and so on. The evaluation was divided into three levels: excellent, good and general, and the rates of good and excellent evaluation were classified as excellent rate.

### 2.3.3 Interest and attention degree in the Otorhinolaryngology Department

The number of graduate students who were willing to work in the Otorhinolaryngology Department or to register the Otorhinolaryngology Department after graduation was counted.

## 2.4. Statistical treatment

The statistical treatment was performed with SPSS 22.0 software, t-test and chi-square test were used, and the difference was statistically significant if  $P < 0.05$ .

### 3. Results

#### 3.1 Examination performance

There was a statistically significant difference in the total score and medical record analysis performance between the two groups by t test of two independent samples ( $P < 0.05$ ), but there was no statistically significant difference in the basic knowledge performance between the two groups ( $P > 0.05$ ). Details of the results are shown in Table 1.

**Table 1 Comparison of otorhinolaryngology examination performance between the two groups (score,  $\pm$ s, )**

Group	N	Total Score	Basic Knowledge	Medical
	42		Score	Record Analysis Score
Experime	38	89.25 $\pm$ 2.16	48.87 $\pm$ 1.57	32.45 $\pm$ 1.31
Control		16.89	0.40	23.10
t value		<0.001	0.69	<0.001
p value				

#### 3.2 Results of the questionnaire

The excellent rate of satisfaction on CTTM was 90.5%. In the aspects of improvement of learning interest, clinical thinking ability, exploration and innovation ability, analysis ability of clinical cases, increase of information amount during probation, improvement of academic performance, systematicness of typical diseases, decrease of learning burden, and satisfaction degree of teaching methods and the like, the difference between the experimental group and the control group was statistically significant ( $P < 0.05$ ), but the difference in mastering theoretical knowledge and improving self-learning ability between the two groups was not statistically significant ( $P > 0.05$ ), as shown in Table 2.

**Table 2 The evaluation results of the two groups on the respective teaching methods [n(%)]**

Survey Items	Experiment Group(n=42)	Control Group(n=38)	$\chi^2$ value	P value
1. Improvement of learning interest	34 (80.9)	23 (60.5)	4.063	0.044
2. Clinical thinking ability	30 (71.4)	19 (50.0)	3.860	0.049
3. Exploration and innovation ability	33 (78.6)	22 (57.9)	3.970	0.046
4. Analysis ability of clinical cases	33 (78.6)	22 (57.9)	3.970	0.046
5. Probation information amount	38(90.5)	28(73.7)	3.896	0.048
6. Mastering of theoretical knowledge	30(71.4)	25(65.8)	0.295	0.587
7. Improvement of academic performance	34(80.9)	23(60.5)	4.063	0.044
8. Systematicness of typical diseases	38(90.5)	28(73.7)	3.896	0.048
9. Improvement of self-learning ability	27 (64.3)	23(60.5)	0.120	0.729
10. Decrease of learning burden	29 (69.0)	18(47.4)	3.870	0.049
11. Satisfaction in teaching methods	38 (90.5)	28(73.7)	3.896	0.048



### 3.3 Interest and attention degree in the Otorhinolaryngology Department

For the number of graduate students who were willing to work in the Otorhinolaryngology Department or to register the Otorhinolaryngology Department after graduation, there were 14 of 42 students in the experimental group (33.3%) and 5 of 38 students in the control group (13.2%), with  $\chi^2 = 4.484$ , and P value = 0.034, so the difference was statistically significant.

## 4. Discussion

In recent ten years, otorhinolaryngology has made rapid development. The establishment of level three discipline has greatly promoted the improvement of clinical diagnosis and treatment, making its teaching content expand and change greatly, but the probation teaching duration is obviously less. In addition, the anatomical structure of otorhinolaryngology is complex, most of which are deep in the hidden lacuna structure, so it is difficult to examine clearly. How to teach this discipline vividly to probation students in a short period of time so that students can easily understand and improve clinical thinking ability and exploration and innovation ability, has become a key issue in clinical teaching of otorhinolaryngology.

The clinical probation in most medical colleges and universities currently adopted the CBL teaching method<sup>[4]</sup>. CBL has the traditional advantages of simplicity and convenience and the like, but is monotonous, boring and insipid, and the students lack the consciousness of active learning. Sometimes the teacher's questions are not deep enough, and the students lack creative spirit and innovation ability and have only one-sided understanding of the diseases during CBL process. In order to deal with the examination, they can only take more time for theoretical learning, causing poor clinical teaching effect. Starting from the teaching practice and referring to the teaching experience of other clinical disciplines, and with the aim of comprehensively cultivating the excellent clinical thinking ability and innovative thinking ability of eight-year medical students, we have designed CTTM. CTTM made full use of video teaching, multimedia teaching, network teaching and so on means to carefully design the teaching plan and courseware, so as to stereoscopically present "simulated patients" and discussion materials of clinical cases<sup>[5]</sup>.

CTTM realized the transformation from simplification to three-dimension with integration of a variety of teaching methods, realized teacher-student interaction in teaching, so that students had the opportunity to discuss cases and exchange ideas with teachers, which was beneficial to improve the overall teaching level<sup>[3]</sup>.

From the analysis of teaching effect, there was a statistically significant difference in the total score and case analysis performance between the experimental group and the control group ( $P < 0.05$ ), but there was no statistically significant difference in the basic knowledge performance between the two groups, indicating that CTTM could significantly improve the problem analysis ability of clinical cases for eight-year probation students, so as to improve the quality of probation teaching.

From the analysis of results of questionnaire, in the aspects of improvement of learning interest, clinical thinking ability, exploration and innovation ability, analysis ability of clinical cases, increase of information amount during probation, improvement of academic performance, systematicness of typical diseases, decrease of learning burden, and satisfaction degree of teaching methods and the like, the difference between the experimental group and the control group was statistically significant, but the difference in mastering theoretical knowledge and improving self-learning ability between the two groups was not statistically significant, suggesting that the CTTM mode did not affect the students' understanding of the basic knowledge of theory and improvement of the self-learning ability, but also motivated the students' learning interest, so that the students had a deep understanding of the typical disease systematicness of the otorhinolaryngology, increased the information amount of probation teaching to effectively enhance the students' clinical thinking ability, exploration and innovation ability and analysis ability of clinical

cases, so as to help to deepen students' understanding of otorhinolaryngological diseases. The improvement of many clinical practice abilities, in essence, has achieved the goal of improving the students' comprehensive quality education, and laid a solid foundation for the students to enter the clinical practice stage in the future. At the same time, under the CTTM mode, the students have mastered the clinical characteristics and the treatment principle of diseases, the learning burden is obviously decreased, and the students are more satisfied with CTTM. Therefore, the results of this study suggest that CTTM can adapt to the development trend of modern teaching, emphasize the role of the teacher's organization, pay more attention to the cultivation of the students' learning interest and good clinical thinking, inspire the students' creative thinking, and realize the optimal combination of teaching and learning.

According to the questionnaire, the number of graduate students who intended to work in the Otorhinolaryngology Department and register otorhinolaryngology discipline after graduation was significantly higher in the experimental group than in the control group. One reason is that CTTM arouses the students' initiative and stimulates the students' interest in otorhinolaryngology, which is beneficial to enhance the influence of otorhinolaryngology. The second is that CTTM exercises the students' clinical practice ability, improves the students' comprehensive quality, and enhances their self-confidence when entering the practice stage.

To sum up, CTTM is a kind of teaching form suitable for modern teaching idea. In the process of probation teaching practice of the Otorhinolaryngology Department, through the interaction between teachers and students, teaching and learning have become a personalized creative process, thus building a bridge between medical theory and clinical practice.

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## Competing Financial Interests

The authors declare no competing financial interests.

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