

ANALYSIS OF APPLICATION EFFECT OF CASE-BASED LEARNING COMBINED WITH VIDEO FEEDBACK IN STANDARDIZED TRAINING OF EMERGENCY RESIDENTS

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ABSTRACT

Introduction: To investigate the application effect of case-based learning (CBL) combined with video feedback in standardized training of emergency residents.

Materials and methods: 36 emergency residents in our hospital were randomly divided into the control group and the experimental group. The experimental group was trained by CBL combined with video feedback, while the control group was trained by traditional teaching method. After 6 months of training, the students' theoretical and practical abilities were assessed, and the mini-CEX was used to evaluate the students' performance, and the satisfaction of the students was recorded.

Results: The theoretical and practical examination scores and mini CEX scores of the experimental group were significantly higher than those of the control group ($P < 0.05$). The degree of satisfaction of the experimental group (94.44%) was significantly higher than that of the control group (77.78%).

Conclusion: Application of CBL combined with video feedback in standardized training of emergency residents can significantly improve students' practical ability and expand their knowledge, and has important clinical application value.

Keywords: Case-based learning, video, standardized training, emergency.

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Introduction

Emergency department is the Department with the most concentrated severe patients and the most abundant disease types in the hospital, which undertakes the task of rescue and management. In most cases, emergency physicians should have the ability of independent judgment and problem-solving, being able to quickly diagnose diseases, rescuing patients, and making the most correct judgment according to limited information in a short time^(1, 2). Due to the high pressure and fast pace of

work, it also brings great challenges for emergency physicians to perform their functions. Emergency doctors are mainly in charge of beds, and responsible for duty, outpatient, and rescue work. Their main responsibilities are ward rounds in the emergency department and the treatment of outpatients and observation patients. At the same time, some doctors also have heavy teaching tasks. Therefore, how to train students to acquire more knowledge of emergency medicine in the limited rotation time of the emergency department, and improve the quality of learning have become the top priority of clinical

teaching^(3,4). Case-based learning (CBL) has always been an important means of clinical teaching. It has the advantages of good operability, good safety, good repeatability, and visualization to establish simulation patient and clinical scene through simulation technology to replace real patients in the implementation of teaching practice activities⁽⁵⁾.

In addition, video feedback is another common teaching method. Students can feel the diagnosis and treatment scene more intuitively and improve their thinking ability by watching and recording the video repeatedly and giving feedback on the content⁽⁶⁾. In this study, CBL combined with video feedback were applied in standardized training of emergency residents, so as to establish an emergency atmosphere for the resident, improve the ability of the resident to skillfully use the clinical emergency skills, and lay the foundation for them to enter the post better.

Materials and methods

Subjects

36 residents who rotate in the emergency department of our hospital were selected as the research objects. The average age of doctors was (24.5±3.7) years old, 21 males, 15 females, 26 undergraduates and 10 postgraduates. All subjects were divided into the control group and the experimental group according to the random number table method, with 18 subjects in each group.

In the control group, the average age was (24.7±3.9) years old, 11 men, 7 females, 12 undergraduates and 6 postgraduates. In the experimental group, the average age of was (23.9±3.6) years old, 10 men, 8 females, 14 undergraduates and 4 postgraduates. The internship time of all subjects was more than 6 months. There were no significant differences in age, gender or educational background between the two groups ($P>0.05$), and they all voluntarily signed informed consent to join the study.

Traditional teaching

The control group was trained with traditional teaching methods. The teacher explained the key contents of the emergency department through class, such as basic operation skills, work precautions, cardiopulmonary resuscitation, ward round and other related contents. At 8:00 a.m. every day, experts from the emergency department gave lectures and discussed in groups after class. After the training, the learning content was displayed, and the lecturer and team members discussed and commented together.

CBL combined with video feedback

The experimental group adopts the way of CBL combined with video feedback, and the specific measures were as follows:

- Set up a management group: the team consisted of one chief physician, two deputy chief physicians and three attending physicians, who were responsible for teaching management, training plan formulation and assessment.

- Training: the syllabus, plan, department and progress of theoretical teaching were consistent with those of the control group, and the teaching time of the experimental group was 8:00 a.m. every day for 1 hour. All the contents of the expert lectures were videotaped and uploaded to the mailbox for students to share. The management team developed training scenarios and central themes according to the theoretical explanations, such as sudden cardiac death, acute coronary syndrome, acute ischemic stroke, respiratory failure, trauma and other emergencies. In each scenario, family members, nurses, doctors and other roles were set up. The teacher conducted scenario simulation, recorded and synthesized high-definition high-quality video, held scenario case sharing meeting, explained the theoretical knowledge, operation skills, emergency events, precautions and other key contents one by one, guided students to think, and completed the task of scenario simulation.

- Rehearsal: students formed teams freely according to their roles, watched the rehearsal videos repeatedly according to the key teaching contents, selected the appropriate central theme, collected relevant information, shared the roles, and completed the scene simulation. Each rehearsal needed to record videos. Group members discussed internally to find out their own shortcomings, and proposed solutions. It was advocated to actively consult the teachers of the management group. The instructor analyzed and summarized the problems encountered by the students in the rehearsal process, and took the initiative to make suggestions for the students.

- Summary and discussion: within the specified time, each group hand in the final complete video and uploaded it to the mailbox for sharing. All participants could comment on each group's performance and exchange opinions. After the training, the management team organized the assessment of theoretical and practical operation skills. The training time of the two groups was 3 months, and the students' abilities were evaluated after the training.

Evaluating indexes

• Assessment score: after the training, the theoretical and practical assessment abilities of the two groups were scored. The theory test paper was compiled by the management team and the closed book examination was organized. The examination time was 60 minutes.

Practice scenarios were also developed by the management team, both of which scored 100 points. Theoretical assessment includes four aspects: basic knowledge, case analysis, practical operation and precautions. Practical operation includes cardiopulmonary resuscitation, trauma management and invasive operation.

The higher the score, the better the training effect of students.

• Mini-CEX score: mini clinical evaluation exercise (Mini-CEX)⁽⁷⁾ was used to evaluate the students' performance, including Interview Skills, Physical examination, Clinical judgment, Communication skills, humanistic care, Organizational effectiveness and Overall performance. 1-9 points for each item, the higher the score, the better the students' performance ability.

• Degree of satisfaction: the satisfaction questionnaire was developed by the management team of our hospital, including three aspects of teaching content, teaching methods and their own practical ability.

The evaluation was divided into dissatisfied, quite satisfied and very satisfied, with a full score of 100. Degree of satisfaction= (very satisfied + quite satisfied)/total cases × 100%.

• Teaching effectiveness: the teaching effectiveness including stimulating learning interest, cultivating self-study ability, improving doctor-patient communication ability, solving problems independently, cultivating logical thinking, improving innovation quality, enhancing team cooperation ability, activating classroom atmosphere, and improving teacher-student communication ability were compared between the two groups.

Statistical methods

SPSS 22.0 software was used for statistical analysis and processing of all data.

The count data was expressed as (%) and analyzed with Rank sum test and chi-square test. The measurement data was expressed as mean ± Standard deviation ($\bar{x} \pm s$) and analyzed with t-test. P<0.05 meant that the difference was statistically significant.

Results

Comparison of theoretical and practical assessment scores between the two groups

The theoretical and practical assessment scores of the experimental group were both significantly higher than those of the control group (P<0.05), as shown in Table 1.

Index	Control group (n=18)	Experimental group (n=18)	t	P
Theoretical assessment	74.23±7.82	89.93±7.53	9.260	<0.001
Practical assessment	70.23±7.58	85.64±8.47	8.681	<0.001

Table 1: Comparison of theoretical and practical assessment scores between the two groups.

Comparison of Mini-CEX scores between the two groups

The scores of each item in Mini-CEX of the experimental group were all significantly higher than those of the control group (P<0.05), as shown in Table 2.

Item	Control group (n=18)	Experimental group (n=18)	t	P
Interview skills	4.46±1.35	7.53±2.48	6.962	<0.001
Physical examination	5.32±1.80	8.14±2.74	5.508	<0.001
Clinical judgment	4.47±1.46	7.53±2.57	6.629	<0.001
Communication skills	4.63±1.85	8.27±2.34	7.813	<0.001
humanistic care	5.78±1.74	8.11±2.68	5.127	<0.001
Organizational effectiveness	4.62±1.43	7.34±2.57	5.922	<0.001
Overall performance	5.57±1.67	7.31±1.45	5.308	<0.001

Table 2: Comparison of Mini-CEX scores between the two groups.

Comparison of degree of satisfaction between the two groups

The degree of satisfaction of the experimental group (94.44%) was significantly higher than that of the control group (77.78%, P<0.05), as shown in Table 3.

Group	n	Very satisfied	Quite satisfied	Dissatisfied	Degree of satisfaction (%)
Control group	18	5	9	4	77.78%
Experimental group	18	8	9	1	94.44%
χ^2	2.733				11.247
P	0.002				<0.001

Table 3: Comparison of degree of satisfaction between the two groups.

Comparison of teaching effectiveness between the two groups

The experimental group was better than the control group in stimulating learning interest, cultivating self-study ability, improving doctor-patient communication ability, solving problems independently, cultivating logical thinking, improving innovation quality, enhancing team cooperation ability, activating classroom atmosphere, and improving teacher-student communication ability ($P < 0.05$, respectively), as shown in Table 4.

Index	Control group			Experimental group		
	Yes	No	Not sure	Yes	No	Not sure
Stimulating learning interest	7	8	3	12*	4	2
Cultivating self-study ability	6	8	4	13*	4	1
Improving doctor-patient communication ability	5	10	3	14*	2	2
Solving problems independently	5	9	4	11*	5	2
Cultivating logical thinking	7	11	0	15*	3	0
improving innovation quality	4	12	2	14*	3	1
Enhancing team cooperation ability	6	10	2	13*	5	0
Activating classroom atmosphere	6	9	3	14*	3	1
Improving teacher-student communication ability	4	13	1	16*	2	0

Table 4: Comparison of teaching effectiveness between the two groups.

Note: *indicated $P < 0.05$ between groups.

Discussion

The emergency department has always been the key department of the hospital, which has the comprehensive characteristics of multi-disciplinary and multi professional. At the same time, it also requires emergency physicians to apply their own ability to deal with emergencies in urgent time, which is also an important reason why the requirements of emergency physicians are much higher than those of other medical majors⁽⁸⁾. However, with the promulgation of various medical laws and regulations and the enhancement of patients' awareness of safeguarding their rights, the learning of emergency physicians' practical ability is limited, especially the difficulty of training on invasive operation is also increased, which also brings great challenges to the improvement of residents' clinical first aid ability^(8, 9). Thus, standardized training of emergency residents has become an important part of emergency teaching. The traditional teaching mode mostly adopts the class mode, playing the

clinical operation video or carrying out the practical training on the simulator. With the improvement of clinical teaching level, clinical simulation teaching is also widely used in various disciplines in the medical field. The introduction of video feedback in simulation practice can make students observe repeatedly, obtain relevant information and have the ability of independent thinking⁽¹⁰⁾. A study reported that⁽¹¹⁾ applied the training mode of mind mapping combined with scenario simulation to emergency nurses' trauma first aid, which was helpful to improve the thinking ability of emergency nurses and improve the quality of trauma first aid nursing. Another study applied the video feedback teaching method to the training of new nurses in the operating room, and found that the theoretical and practical assessment ability of nurses was significantly improved⁽¹²⁾. Thus, it is of great importance to apply CBL combined with video feedback in standardized training of emergency residents.

The video feedback teaching method helps the inexperienced doctors to observe the details repeatedly, master the key points of clinical operation, understand and overcome the difficulties through vision, hearing and other senses, which is more conducive to the flexible application of knowledge and skills, and increases the initiative and enthusiasm of learning⁽¹³⁾. CBL can reproduce clinical treatment scenes, combine theoretical knowledge with practical operation, and promote students to skillfully apply the theoretical knowledge in clinical work, so as to improve their comprehensive ability⁽¹⁴⁾. However, as the performance time of CBL is limited, it is still difficult for students to restore the standard operating procedures and practical skills taught by teachers. Therefore, the combination of video feedback and CBL is conducive to young doctors to acquire knowledge points, master the core content of skills, and improve their comprehensive level. In addition, in teaching progression, professional instructors could closely control the quality of CBL, attach importance to the core issues of case discussion, and feedback various problems encountered by students in the process of drilling, which is conducive to students to master the key points of knowledge. Besides, the high-definition and high-quality video can also attract students to watch repeatedly and strengthen their memory. In this study, compared with the traditional training model, CBL combined video feedback could improve the students' theoretical knowledge and practical operation ability, and the difference was statistically significant ($P < 0.05$). CBL has the characteristics of

low risk, repeatable operation, strong interest and so on. For projects with few opportunities for clinical practice, such as suturing incision, cardiopulmonary resuscitation, gastric lavage, thoracoabdominal puncture or operations involving personal privacy, CBL can carry out demonstration teaching and practice through simulated human⁽¹⁵⁾. Virtual clinical emergency cases can help students master the standard operation, and after passing the examination, it can be applied to the actual patients to reduce the contradiction between doctors and patients. This kind of training mode can help students to establish good psychological quality, deal with it in an orderly and calm way in the actual work, improve students' self-confidence and the degree of trust of patients at the same time. The instructor can also design common emergency cases according to the needs of the syllabus, and provide practical opportunities for students in the form of real scenes from admission diagnosis to treatment process. On the other hand, the form of video feedback can help students better grasp the key points of knowledge and make up for the uneven distribution of teaching resources and the lack of sharing resources.

In this study, the students in the experimental group have better performance in the CBL, and their satisfaction with their own ability and teachers' teaching were also greatly improved. In emergency work, patients' condition is complex and changeable, and most of them are in great danger of life, so general practitioners can't practice in emergency patients. In emergency department training, CBL combined with video feedback can improve the enthusiasm of interns' learning and consolidate the knowledge of case mastery effectively. When the students meet the corresponding difficulties, they discuss with each other and search for relevant information, so as to cultivate and exercise their clinical thinking, and reserve more knowledge and corresponding ideological preparation for the future emergency work^(16,17). In this study, the experimental group was significantly higher than the control group in self-learning ability, independent problem-solving and innovative quality, and the differences were statistical significantly ($P < 0.05$).

In conclusion, application of CBL combined with video feedback in standardized training of emergency residents can significantly improve students' practical ability, expand their knowledge, improve their comprehensive level, lay the foundation for future clinical work, and has important clinical application value

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