

# Application Research of Fragmented Case Teaching in Standardized Training of Residents in Anesthesiology Department

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**Abstract:** *Objective:* To explore the effect of fragmented case teaching in the standardized training of residents in anesthesiology department. *Methods:* 80 doctors who participated in the standardized training of residents in anesthesiology department from January 2021 to January 2022 were selected as the research objects, and the 80 doctors were divided into experimental groups according to the clinical teaching mode ( $n = 40$ , implemented case fragmented teaching method) and the control group ( $n = 40$ , traditional teaching method). The training lasted for 2 months, and the medical history collection, medical record analysis, practical operation ability, theoretical assessment results, and the degree of satisfaction towards the training of the two groups of doctors were compared. *Results:* After 2 months of training, the theoretical knowledge and operational ability of the doctors in the two groups have improved to a certain extent, but the medical history collection, medical record analysis, practical operation ability, theoretical assessment results and satisfaction of the doctors in the experimental group were significantly better than those in the control group ( $P < 0.05$ ). *Conclusion:* The effect of the fragmented case teaching method in the standardized training of anesthesiology residents is significantly better than the traditional teaching mode. The abilities of doctors have significantly improved after the training. Hence, the fragmented case teaching method is worthy of promotion in clinical practice.

**Keywords:** Case fragmentation teaching; Anesthesiology department; Resident physician; Standardized training; Application

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## 1. Introduction

The standardized training of anesthesiology residents is a systematic professional training program given to anesthesiology residents to improve their capabilities, so as to provide a better service for the patients<sup>[1]</sup>. The training includes theoretical teaching, clinical operation skills training, case studies, and other content. The purpose of this program is so that residents will be able to master basic knowledge and skills required

in the anesthesiology department, and to improve their operation techniques and risk control capabilities [2]. Standardized training for anesthesiology residents is essential to improve their skills and clinical capabilities. It ensures they can carry out anesthesia procedures independently, while also making these procedures safer and more effective. This training reduces the chances of anesthesia accidents, instills a strong sense of professional ethics and responsibility in the residents, and helps them develop a deep commitment to patient care [3,4]. The standardized training of residents in anesthesiology department is one of the key measures to improve the quality of medical services and the safety of the patients. This article discusses the standardized training for anesthesiology residents and analyzes the application of fragmented case teaching.

## **2. General information and research methods**

### **2.1. General information**

A total of 80 doctors who participated in the standardized training of anesthesiology residents within one year from January 2021 to January 2022 were selected as the research subjects. The doctors were divided into experimental group and control group, with 40 doctors in each group. The control group consisted of 23 males and 17 females, with an age range of 19 to 26 years and an average age of  $20.33 \pm 1.21$  years. In the experimental group, there were 24 males and 16 females, with an age range of 18 to 27 years and an average age of  $20.81 \pm 0.92$  years. The general data showed no statistically significant differences between the two groups ( $P > 0.05$ ), indicating that these differences did not impact the study results.

### **2.2. Research methods**

The control group underwent regular training and the experimental group underwent fragmented case teaching. The training lasted for 2 months.

#### **2.2.1. Regular teaching**

(1) Theoretical teaching

Theoretical training involved systematically introducing the basic knowledge and theories of anesthesia science, such as anesthesia pharmacology, anesthesia mechanics, and anesthesia monitoring. The theories were taught through classroom lectures, Powerpoint slides, case studies, and video teaching.

(2) Practical operation skills training

Skills training were done through simulations, experimental animals, live models, etc. The content of skills training involved operations like endotracheal intubation, central venous puncture, nerve block, anesthesia depth monitoring, etc.

(3) Case discussion

Anesthesia problems encountered in clinical practice were discussed and resolved through methods such as case analysis, medical history collection, and imaging interpretation, with the aim of enhancing the clinical practice ability and resilience of anesthesiology residents.

(4) Personalized training

Personalized training plans and programs were developed based on the characteristics of the doctors, such as providing more practical opportunities and guidance for inexperienced residents, and providing more opportunities for case discussion and exchange for experienced residents.

(5) Supervision and assessment

The residents were regularly supervised and assessed to ensure the quality and effect of training. Residents with good results were rewarded to promote their active participation in training and learning.

### 2.2.2. Fragmented case teaching

- (1) Case screening: Classic cases from the department of anesthesiology's clinical practice were screened, and representative and educational cases were selected as teaching materials.
- (2) Case analysis: The cases were broken down into different fragments, such as medical history collection, physical examination, imaging interpretation, surgical operation, etc., so as to facilitate in-depth explanation and discussion of different links.
- (3) Fragment teaching: The fragments of each case were taught individually, focusing on the relevant knowledge, skills and precautions, so that doctors can better understand and master them.
- (4) Integrated discussion: After the fragments of each case were taught, an integrated discussion was carried to connect the fragments of the case into a complete case, so that doctors can fully grasp and apply the knowledge and skills they have learned.
- (5) Interactive communication: Doctors were encouraged to actively participate in discussions and put forward their own views and questions, so as to promote classroom interactions and improve learning effects.
- (6) Practical training: Practical training was carried out on the basis of fragmented case teaching in the form of simulators, experimental animals, real-life models, etc., so as to further improve the practical skills of doctors and their adaptability.
- (7) Teaching evaluation: Case fragmentation teaching was regularly assessed, with feedback collected to gauge doctors' learning progress and effectiveness. Issues were identified and teaching methods were optimized for continuous improvement.

### 2.3. Observation indicators

The medical history collection, medical record analysis, practical operation ability, theoretical assessment results and doctor satisfaction of the two groups of doctors were compared.

### 2.4. Statistical analysis

Statistical analysis of the data was conducted using SPSS 22.0 software. Measurement data were presented as mean  $\pm$  standard deviation and analyzed using t-tests. Count data were assessed using the  $\chi^2$  test and expressed as percentages (%). Statistically significant data differences were denoted by  $P < 0.05$ .

## 3. Results

### 3.1. Medical history collection and medical record analysis

The doctors in the experimental group scored better in terms of medical history collection and medical record analysis compared to the control group, and the difference between the two groups was statistically significant ( $P < 0.05$ ), as shown in **Table 1**.

**Table 1.** Comparison of medical history collection and medical record analysis between the experimental group and the control group (mean  $\pm$  standard deviation)

Group	Number of cases	Medical history collection	Medical record analysis	Doctor satisfaction
Experimental group	40	92.38 $\pm$ 3.66	93.32 $\pm$ 0.28	82.01 $\pm$ 9.32
Control group	40	79.28 $\pm$ 3.12	76.31 $\pm$ 1.41	77.33 $\pm$ 9.12
<i>t</i>	-	17.227	74.837	2.270
<i>P</i>	-	0.001	0.001	0.026

### 3.2. Theoretical and operational assessment results

Before the teaching, an evaluation of the theoretical and operational proficiency of doctors in both the experimental and control groups was conducted. The evaluation results indicated no notable disparity in scores between the two groups, with no statistical significance ( $P > 0.05$ ). Following the teaching, the theoretical and operational competencies of doctors in both groups significantly improved. However, the assessment scores for theoretical knowledge and operational abilities in the experimental group were notably higher than those in the control group, with a statistically significant difference ( $P < 0.05$ ). Refer to **Table 2** for details.

**Table 2.** Comparison of theoretical and operational assessment scores between the experimental group and the control group (mean  $\pm$  standard deviation)

Group	Number of cases	Theoretical knowledge examination results		Operational ability test score	
		Before teaching	After teaching	Before teaching	After teaching
Experimental group	40	68.43 $\pm$ 5.22	92.38 $\pm$ 3.66	70.13 $\pm$ 2.54	88.36 $\pm$ 2.44
Control group	40	68.28 $\pm$ 5.12	80.28 $\pm$ 3.12	70.24 $\pm$ 2.56	76.89 $\pm$ 2.16
<i>t</i>	-	0.130	2.762	0.193	2.853
<i>P</i>	-	0.898	0.007	0.848	0.006

### 3.3. Degree of satisfaction towards the training

After teaching, the doctors in the experimental group were more satisfied with the training program compared to the doctors in the control group, and the difference between the two groups was statistically significant ( $P < 0.05$ ), as shown in **Table 3**.

**Table 3.** Comparison of doctor satisfaction between the experimental group and the control group [*n*, %]

Group	Number of cases	Satisfied	Mediocre	Dissatisfied	Total satisfaction
Experimental group	40	92.5% (37/40)	5% (2/40)	2.5% (1/40)	92.5%
Control group	40	77.5% (31/40)	15.0% (6/40)	7.5% (3/40)	77.5%
$\chi^2$	-	8.824	5.556	2.632	8.824
<i>P</i>	-	0.003	0.018	0.017	0.003

## 4. Discussion

Residents in the anesthesiology department receive a standardized training so that they can perform anesthesia monitoring for patients that require surgery. Anesthesiology residents are required to acquire a thorough understanding of anesthesia-related knowledge and skills, encompassing anesthesia pharmacology, mechanics, monitoring, and more. They must also gain clinical experience and adaptability to ensure the safety and efficacy of anesthesia procedures<sup>[5]</sup>. Their daily responsibilities in anesthesiology primarily involve providing anesthesia services to patients undergoing surgery or treatment, with a focus on ensuring patient safety and comfort. This includes conducting comprehensive patient assessments, considering factors such as physical condition, medical history, and medications, and tailoring anesthesia plans accordingly for different patients<sup>[7]</sup>. Residents are responsible for implementing anesthesia protocols and monitoring and caring for patients post-anesthesia to ensure a safe recovery process. Therefore, it is clear that anesthesia is of great significance to the treatment of patients. The competence of anesthesiology residents significantly influences the safety and effectiveness of anesthesia procedures. Standardized training for these residents is crucial for ensuring patient safety, enhancing

the quality of medical services, and advancing healthcare. It represents a necessary step in development and holds substantial practical and long-term significance <sup>[8]</sup>.

The regular training program allows doctors to understand the relevant knowledge and skills of anesthesiology by teaching basic theoretical knowledge, so as to improve their professional skills. Through the program, doctors are able to master the skills of anesthesia operation, so as to improve their practical skills <sup>[9]</sup>. However, anesthesiology is a complex subject that requires a long period of study and practice to master. Under regular training, doctors may lack opportunities to develop their hands-on skills <sup>[10]</sup>. Therefore, despite it having an important role in the standardized training of anesthesiology residents, but it also has some imperfections. Therefore, it is necessary to consider the actual situation and adopt a variety of teaching methods and means to improve the teaching effect and quality <sup>[11]</sup>. Fragmented case teaching decomposes and integrates various teaching content. The principle of fragmented case teaching is to decompose a complete case into different fragments, such as medical history collection, physical examination, imaging interpretation, surgical operation, etc., and then explain and discuss them one by one, and finally integrate the fragments to form a complete case <sup>[12,13]</sup>. When the cases are broken down into fragments, relevant knowledge and skills can be learned and mastered more deeply, thereby improving the professional skills of doctors. At the same time, fragmented case teaching allow doctors to understand the common problems anesthesia operations and their solutions, thereby improving their resilience and practical abilities.

Furthermore, fragmented case teaching has the advantage of breaking down complex knowledge into smaller, more manageable fragments, facilitating doctors' understanding and mastery, ultimately leading to improved teaching effectiveness and quality [14]. Additionally, this approach breaks the teaching content into distinct fragments, simplifying the evaluation and feedback of teaching outcomes. It aids in promptly identifying and rectifying any issues in the teaching process. In summary, fragmented case teaching represents an innovative and standardized training approach for anesthesiology department residents. In actual teaching, the flexible utilization of this method according to specific circumstances can significantly enhance teaching effectiveness and quality <sup>[15]</sup>. The results of this study showed that it substantially enhances doctors' theoretical knowledge and operational skills. Compared to conventional teaching methods, the fragmented case teaching method places greater emphasis on breaking down and integrating teaching content, enabling doctors to attain a deeper grasp of relevant knowledge and skills. Furthermore, the case fragmentation teaching method fosters interaction among doctors, thereby enhancing the learning experience and satisfaction.

## 5. Conclusion

In summary, fragmented case teaching serves as an innovative training model for anesthesiology department residents. It offers a wealth of content, flexible teaching approaches, and notable learning outcomes. This approach assists residents in achieving a deeper understanding and mastery of anesthesia science knowledge and skills, enhancing their clinical competence and treatment outcomes. Consequently, it contributes to the overall improvement of the quality and safety of anesthesiology medical care.

## Disclosure statement

The authors declare no conflict of interest.

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