

## Original Article

# Using bilingual instruction to improve oncology residents' academic performance and teaching satisfaction

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**Abstract:** Objective: To observe the training effects of bilingual instruction on resident doctors in oncology departments. Methods: Twenty-four oncology residents were selected and randomly placed into the bilingual instruction group or the Chinese instruction group, each with 12 doctors. The bilingual instruction group received bilingual instruction in Chinese and English, and the Chinese instruction group received only Chinese instruction. The instruction effect, the satisfaction with the instruction, and other indicators were observed and used for further correlation analyses. Results: The examination, classroom performance, and total scores of the bilingual instruction group were (45.15±3.60), (40.83±3.24), and (85.48±3.44) and were all much higher than the corresponding scores in the Chinese instruction group (36.30±4.50), (38.16±2.39), and (74.95±3.11), respectively (P<0.05). The theory, operation, and consolidated, results scores in the bilingual instruction group were all much higher than they were in the Chinese instruction group (P<0.001). The bilingual instruction group had a significantly higher frequency of participation in the English lectures, better speaking skills, and much better English levels than the Chinese instruction group (P<0.001). No significant difference was found in the teamwork abilities between the two groups (P>0.05), but the bilingual instruction group had much higher learning interest and initiative, closer interaction with the teachers, and stronger self-learning and problem-solving abilities than the Chinese instruction group (P<0.05). On the whole, the bilingual instruction group had higher satisfaction than the Chinese instruction group (P<0.05). Conclusion: Bilingual instruction effectively helps to enhance the instruction effect of oncology residents, improves their English levels, and increases their satisfaction with the teaching, so it is worth popularizing and applying.

**Keywords:** Bilingual instruction, oncology departments, residents, instruction, teaching satisfaction

## Introduction

Chinese is the dominant language for medical instruction in China, with the advantage of convenient communication and the disadvantage of not being conducive to international communication. At present, English is regarded as the world's main communication language, including in the medical field. However, English education for medical students is still in the development stage in China. Most medical colleges and universities have already carried out bilingual instruction, aiming to increase the quality of education and improve clinical communication, and to finally achieve the goal of promoting bilingual instruction in medical field [1]. According to the requirements of bilingual in-

struction under the modern medical system, experts in related fields proposed that medical workers must strengthen their foreign exchanges and cooperation, keep innovating and exploring new knowledge, so as to stand in the forefront of medicine [2].

Residents often have rich clinical experience and professional knowledge, but they have a relatively weak foundation in bilingual instruction. Thus, bilingual standardized training is a unique and necessary education component of clinical training, and helps to improve medical quality, ensure medical safety, and improve the professional qualifications of the medical students. Surgical oncology is a clinical discipline that closely links theory with practice. At pres-

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**Table 1.** General information

Group	n	Male and Female	Average age	Academic performance	Comprehensive ability
Bilingual Teaching Group	12	8/4	26.56±1.55	30.24±3.22	70.56±4.67
Chinese Teaching Group	12	6/6	27.19±1.24	31.09±2.90	71.22±4.33
$\chi^2/t$		0.750	1.033	0.336	0.569
P		0.459	0.217	0.724	0.554

ent, there are more than 100 million people suffering from different cancers. Tumors have become the main threat to human life and health, and cancer is a global public health problem. Due to the characteristics of the complex conditions and diverse clinical symptoms among cancers, residents in oncology departments need to learn scientifically, comprehensively, and systematically. In addition, interns or residents need to learn about international medical knowledge in the process of acquiring their professional knowledge. Therefore, the proficient application of English can improve residents' professional skills, so they can have a more comprehensive and detailed understanding of the diseases seen in oncology departments [3, 4]. Therefore, 24 surgical oncology residents in our study cohort at Changhai Hospital of Shanghai, The Second Military Medical University received regular instruction or bilingual instruction. The corresponding instruction effects were observed and our findings are detailed below.

## Materials and methods

### General information

Twenty-four residents in the oncology department of Changhai Hospital of Shanghai, The Second Military Medical University were recruited as the study cohort and from July 2018 to August 2019 were randomly placed into the bilingual instruction group or the Chinese instruction group. There were 12 residents in the bilingual instruction group, including 8 males and 4 females, with a median age of 25. There were 12 residents in the Chinese instruction group, including 6 males and 6 females, with a median age of 26. The doctors in the study cohort all passed College English Test Band 6 (CET-6), and none had ever received bilingual instruction. Their general information is shown in **Table 1**.

### Methods

Both groups were taught according to the syllabus, and the instruction methods were combined with multimedia and other instruction modes. On the basis of the same instruction contents and methods, the bilingual instruction group adopted Chinese and English instruction, and the Chinese instruction group adopted Chinese instruction. The instruction lasted for 3 months, and then the instruction's effects and the teaching satisfaction were investigated.

The bilingual instruction group was taken as an example: The theoretical knowledge test consists of Chinese and English parts, which are taught according to the unified instruction schedule and covers training in theory and skills.

1) The students were required to preview the course materials before class according to their own English levels, so that they could be more familiar with the key English vocabulary in the course in advance and better adapt to a bilingual class.

2) In the process of teaching, many instruction methods can be adopted. For example, English simulation exercises can be carried out by using images. At the same time, on-the-spot operations should also be noted in order to improve the comprehensive teaching effect.

3) Learn 2-4 English words about oncology every day, and translate one English medical article every week by consulting a medical dictionary. Mistakes in grammar and other errors in the translated literature were explained by the professional personnel. In addition, the teachers expand the students' knowledge according to the training requirements. They encouraged the learners to take part in the creation of bilingual courseware to improve their learning.

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4) The teachers led the students in a roundtable discussion on professional medical vocabulary in English. Under the guidance of a teacher regarding the form and content, each student was required to design a professional lecture on English medical knowledge within 30 days.

5) The students took the English proficiency test every week and were encouraged to interact with their classmates who have weaker spoken English skills. The teachers and students created courseware together according to the clinical cases presented and then explained it in English. In the process of presenting the information, the students were also encouraged to ask questions, which helps to improve their oral English levels.

6) The instructors combined the original textbooks from foreign countries and material on the actual clinical situation in China together, and they included the classic English oncology monographs as reading material to expand the range of knowledge.

7) The students were encouraged to attend English lectures given by foreign experts and to speak actively to improve their oral communication ability.

The Chinese instruction group only received Chinese instruction, but the learning process and content were the same as they were in the bilingual instruction group.

### *Outcome measures*

*Main outcome measures:* Comparison of the mastery of the learning content: In order to determine the students' mastery of the learning content, the students' mastery of professional classroom knowledge (through professional examination evaluations given after class) and the classroom performance were evaluated [5]. The content of the examinations was determined by the non-examination-subject teachers referencing the instruction topics, and single person examinations were conducted. The scoring group consisted of more than two teachers with lessons and the total score took into account the examination, classroom participation, etc., with a total possible score of 50 and a passing score of 40. The higher the score, the better the mastery of the students.

Comparison of the training results: After the instruction was completed, a third party other than the training teacher analyzed and compared the theoretical performance (Chinese and English noun explanation, selection, and case analysis), the operation results and consolidated results of two groups. The total possible score was 100. The higher the score, the better the mastery of the students.

Comparison of the learning process indicators: The frequency of participation in the English lectures, the speaking abilities, and the English levels of the two groups were compared. The score range was 0-100. The higher the score, the better the mastery of the students.

Teaching satisfaction: The overall satisfaction levels of the two groups were evaluated, with a total possible score of 100. Very satisfied, satisfied, and dissatisfied were grouped with the scores of  $\geq 90$ , 70-89, and  $< 70$ , respectively. Satisfaction = (Very satisfied + satisfied)/N \* 100%.

*Secondary outcome measures:* Questionnaire: A questionnaire was given to the two groups of personnel, that covered the increase in learning interest and initiative, interaction with the teachers, self-study ability, team cooperation ability, and problem-solving ability. The total possible score of the questionnaire was 24 points, with a survey degree of 100%.

### *Statistical analysis*

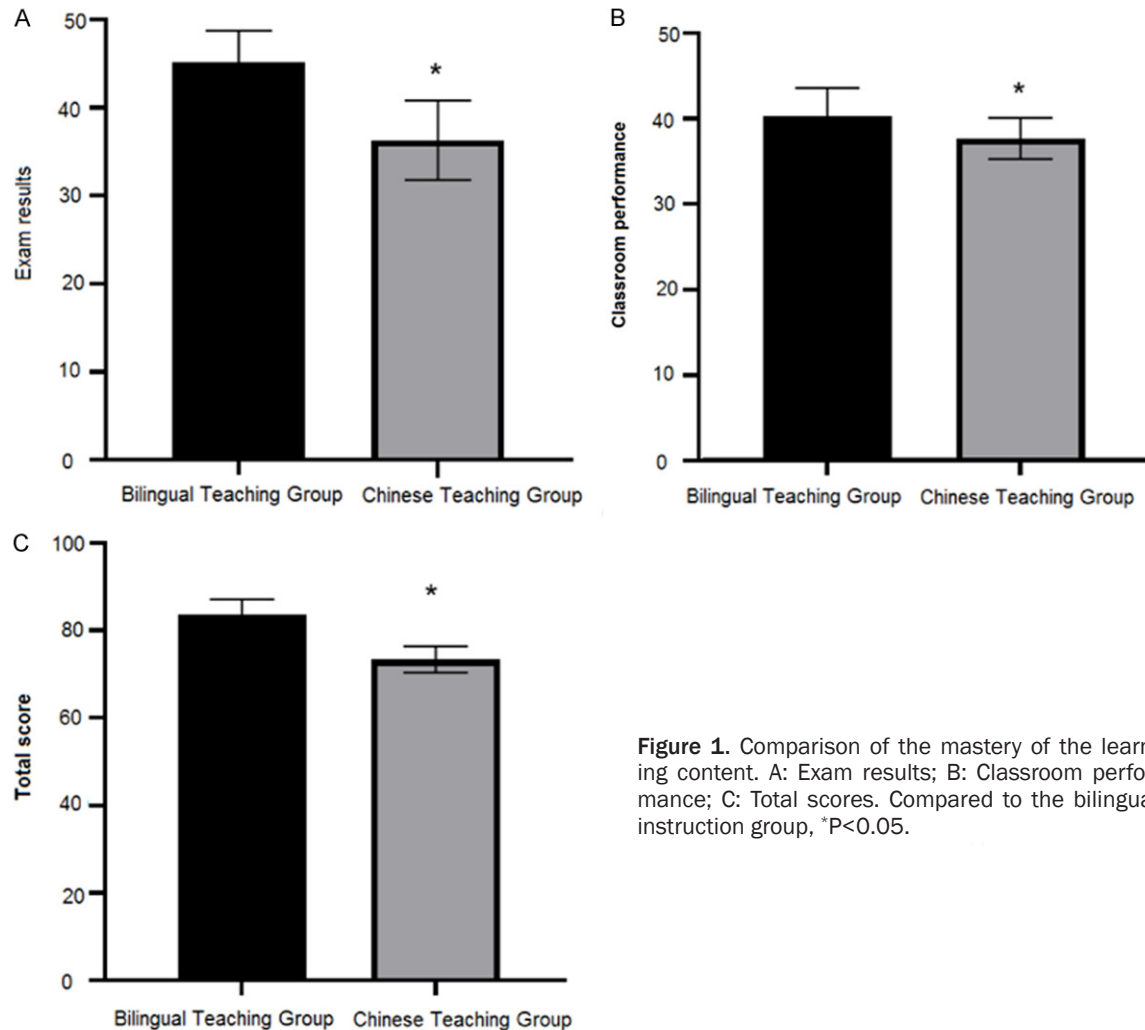
SPSS 23.0 statistical analysis was used. The content mastery and scores were expressed as ( $\bar{x} \pm sd$ ), and t tests were used for the comparisons among groups. The student satisfaction and questionnaire results were expressed as (n, %), and  $\chi^2$  tests were used for the comparisons among groups.  $P < 0.05$  indicates that a difference was statistically significant.

## **Results**

### *Comparison of the mastery of the learning content*

The bilingual instruction group had much higher exam results, classroom performance, with corresponding total scores of ( $45.15 \pm 3.60$ ), ( $40.83 \pm 3.24$ ) and ( $85.48 \pm 3.44$ ), than the

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**Figure 1.** Comparison of the mastery of the learning content. A: Exam results; B: Classroom performance; C: Total scores. Compared to the bilingual instruction group, \*P<0.05.

**Table 2.** Comparison of the training results

Group	n	Theoretical performance	Operation results	Consolidated results
Bilingual Teaching Group	12	90.11±1.75	92.80±1.73	93.06±2.13
Chinese Teaching Group	12	83.66±1.32	86.31±1.55	89.33±3.20
t		10.190	9.679	3.361
P		<0.001	<0.001	<0.001

Chinese instruction group which had scores of (36.30±4.50), (38.16±2.39), and (74.95±3.11) (all P<0.05). See **Figure 1**.

### Comparison of the training results

The bilingual instruction group had better theoretical performance, better operation results, and better consolidated results than the Chinese instruction group (all P<0.001). See **Table 2** and **Figure 2**.

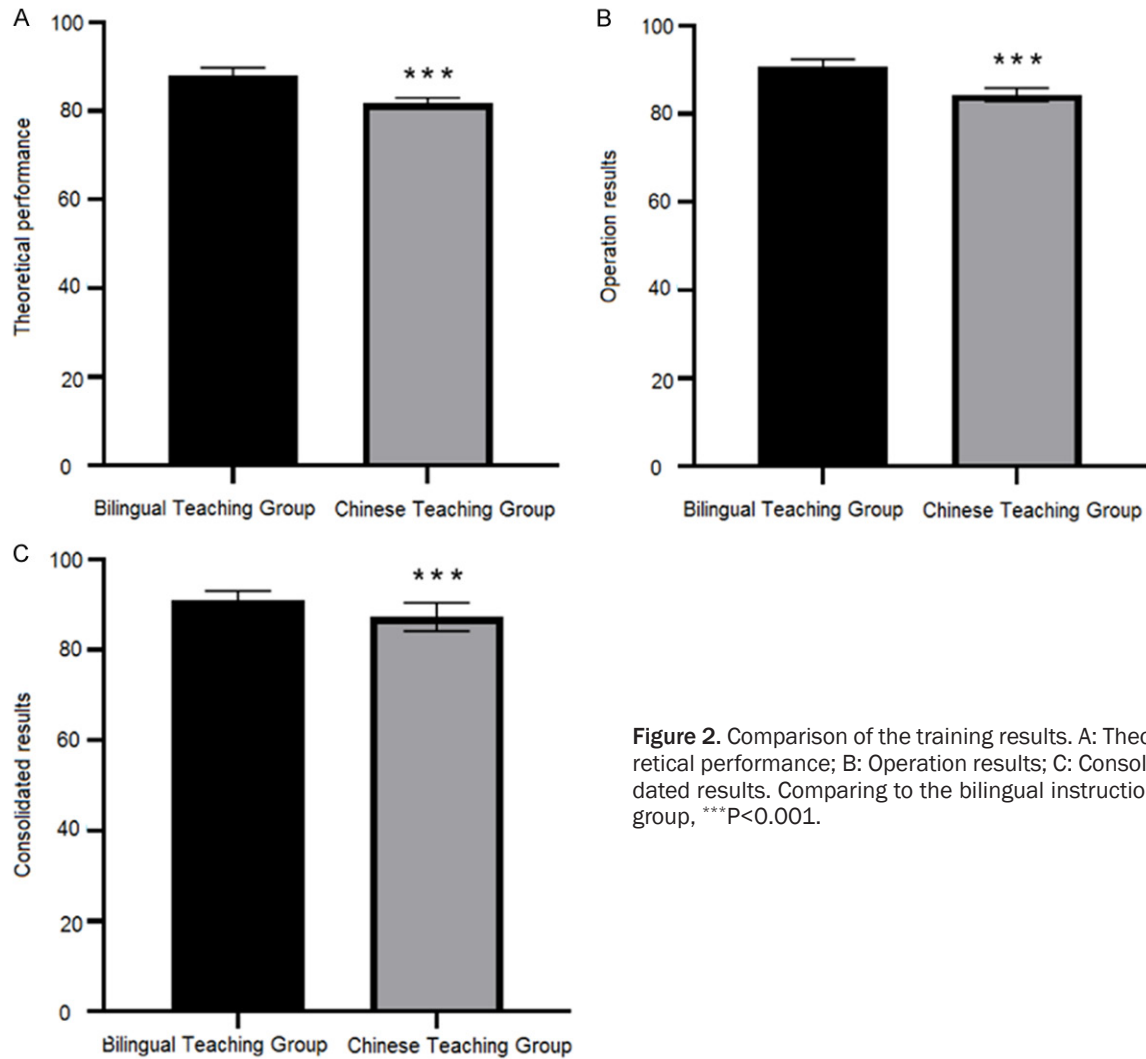
### Comparison of the learning process indicators

The bilingual instruction group had a higher frequency of participation in the English lectures, better speaking abilities, and higher English proficiency than the Chinese instruction group (all P<0.001). See **Table 3** and **Figure 3**.

### Comparison of the questionnaire results

No significant difference was found in the team cooperation abilities in the two groups (P>0.05), but the remaining indicators in the bilingual instruction group were much higher than the corresponding indicators in the Chinese instruction group (P<0.05). See **Table 4**.

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**Figure 2.** Comparison of the training results. A: Theoretical performance; B: Operation results; C: Consolidated results. Comparing to the bilingual instruction group, \*\*\* $P < 0.001$ .

**Table 3.** Comparison of the process indicators

Group	n	Frequency of participation in English lectures	English proficiency
Bilingual Teaching Group	12	87.30±3.05	88.80±4.43
Chinese Teaching Group	12	80.46±2.72	81.31±5.05
t		6.438	5.026
P		<0.001	<0.001

### Comparison of the teaching satisfaction

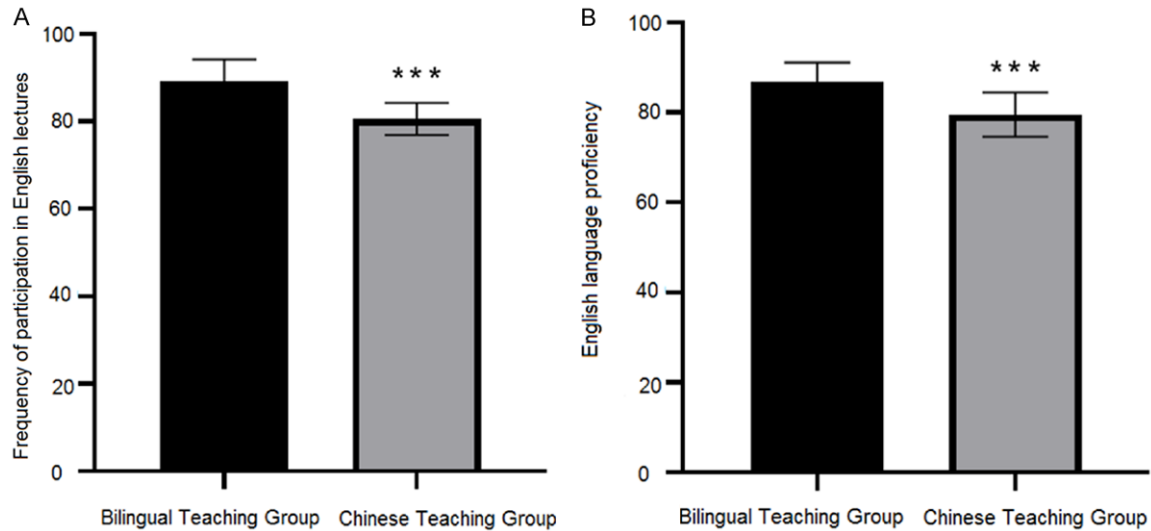
There were differences in the teaching satisfaction in the two groups. The very satisfied rating in the bilingual instruction group was 33.33%, which was significantly higher than very satisfied rating given in the Chinese instruction group ( $P < 0.05$ ). The difference in the proportions of the satisfied ratings given in the two groups was not significant ( $P > 0.05$ ). The pro-

portion of the Chinese instruction group giving a dissatisfied rating was 25%, but it was just 8.33% in the bilingual instruction group ( $P < 0.05$ ). The overall teaching satisfaction rating in the bilingual instruction group was much higher than it was in the Chinese teaching group ( $P < 0.05$ ). See **Table 5** and **Figure 4**.

### Discussion

Bilingual instruction is an important link between China's medical education and international education. Now, the Ministry of Education also encourages medical colleges to use bilingual instruction, so improving doctors' English proficiency is a hot topic for many scholars [5]. Many hospitals have implemented professional training for residents, but there is still

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**Figure 3.** Comparison of the learning process indicators. A: Frequency of participation in the English lectures; B: English proficiency. Compared to the bilingual instruction group, \*\*\*P<0.001.

**Table 4.** Comparison of the questionnaire results

Items	Bilingual instruction group (n, %)	Chinese instruction group (n, %)	$\chi^2$	P
Increased interest in learning	11 (91.67)	9 (75.00)	4.179	0.041
Learning initiative	10 (83.33)	8 (66.67)	4.54	0.033
Enhanced interaction with teachers	9 (75.00)	7 (58.33)	5.000	0.025
Increased teamwork	11 (91.67)	10 (83.33)	0.397	0.589
Improved self-learning ability	10 (83.33)	9 (75.00)	3.797	0.049
Improved problem-solving skills	9 (75.00)	7 (58.33)	4.571	0.033

**Table 5.** Comparison of the teaching satisfaction

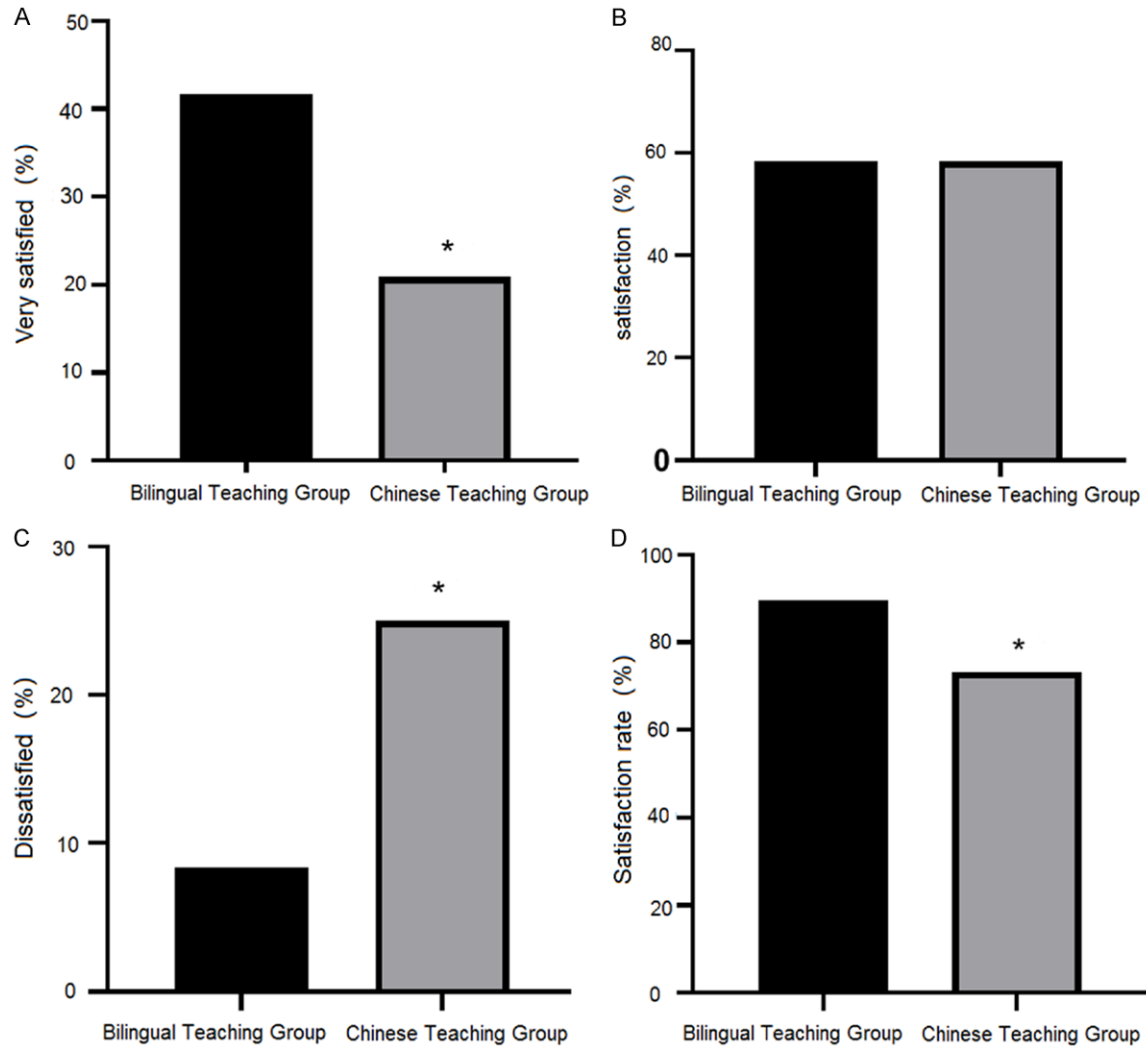
Group	n	Very satisfied	Satisfaction	Dissatisfied	Satisfaction rate
Bilingual instruction group	12	4 (33.33)	7 (58.33)	1 (8.33)	11 (91.67)
Chinese instruction group	12	2 (16.67)	7 (58.33)	3 (25.00)	9 (75.00)
t		3.889		4.047	4.379
P		0.046		0.041	0.038

no clear instruction method for residents to effectively improve their foreign language skills [6, 7]. This study combines many years of internship and resident training experience, and through the flexible combination of classroom instruction and video-based English simulation exercises, the residents' professional knowledge and English-language skill levels were effectively improved.

In our study, we first assessed the students' English levels using an English assessment test. Then, professional knowledge instruction was carried out using imaging and other ways

to increase the learning, and the residents' English language knowledge was broadened through the study of English language medical terms. Also, the students were guided to preview the professional vocabulary related to oncology departments in the hospital rounds process, and were encouraged to improve their oral English proficiency levels using English explanation. The combination of various learning methods helps to mobilize the residents' enthusiasm and helps with the standardized training, so as to strengthen the understanding and mastery of the knowledge learned [8, 9]. He et al. pointed out that bilingual instruction

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**Figure 4.** Comparison of the teaching satisfaction. A: Very satisfied; B: Satisfied; C: Dissatisfied; D: Satisfaction rate. Compared to the bilingual instruction group, \*P<0.05.

in kidney internal medicine practice can effectively increase the level of medical English, expand the amount of knowledge, and improve the interest and enthusiasm [10]. According to the research of Dongmei et al., bilingual instruction using the foreign language immersion mode was conducive to improving doctors' ability to listen, speak, read, and write in English [11]. According to the research of Wang et al. in the *Chinese journal of rehabilitation medicine*, bilingual instruction is conducive to improving students' professional ability and knowledge literacy [12]. Our study shows that the bilingual instruction group learned more than the Chinese instruction group, as demonstrated by the test scores, classroom performance, professional knowledge, operational ability, and comprehensive scores, indicating that bilingual

instruction can improve residents' learning efficiency and quality [13].

In the process of bilingual instruction, the medical knowledge of the students was enriched by actively consulting foreign literature, and their interest in the learning process was stimulated. At the same time, students are encouraged to participate in English lectures held by foreign experts and to speak actively, which is conducive to improving their oral English communication ability and providing new ideas and methods for international case studies [14]. A previous study showed that bilingual instruction encourages students to participate in English conversations to improve their oral English proficiency. Students can gradually understand English professional vocabulary in the process

of making English courseware, which is conducive to mobilizing students' enthusiasm and enthusiasm for learning [15, 16]. According to Vargas, bilingual instruction is an innovative instruction method, and it can significantly increase the quality of the training and one's international communication abilities during the professional study of obstetrics and gynecology residents [17]. According to Wu et al., bilingual instruction is an inevitable trend in medical education [18, 19]. Bilingual instruction runs through basic medical clinical learning to increase students' foreign language abilities and international communication abilities and can improve learning efficiency and teaching satisfaction. Our study showed that the bilingual instruction group had a higher frequency of participation in English lectures, better spoken language abilities, and higher English proficiency than the Chinese instruction group. Thus, bilingual instruction is more conducive to improving the instruction quality of for oncology surgery residents, increases the ability of active learning and increases teaching satisfaction, which is similar to the research results of Huang et al. [20, 21].

With the development of medicine, international communication is more and more frequent. Bilingual instruction is an inevitable trend in medical instruction and is also the cornerstone of increasing the exchange of professional knowledge and views between domestic and foreign medical professionals. By improving the professional knowledge and international communication abilities of residents in the oncology department, bilingual instruction can serve as a model for improving instruction quality and for training excellent medical talents. However, the sample size of this experiment was relatively small, so the experimental results may be invalid. In future research, more experimental samples and methods will be added to get a more favorable experimental basis for clinical instruction.

To sum up, bilingual instruction can improve the instruction of oncology residents, enhance their English proficiency and increase their teaching satisfaction, so it is worthy of promotion and application.

### Disclosure of conflict of interest

None.

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