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**Teach-back model-based health education in patients undergoing  
oral implant surgery**

Едукација пацијената о здрављу на основу модела *teach-back* код особа  
које се подвргавају хирургији оралних имплантата

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## Teach-back model-based health education in patients undergoing oral implant surgery

Едукација пацијената о здрављу на основу модела *teach-back* код особа које се подвргавају хирургији оралних имплантата

### SUMMARY

**Introduction/Objective** To observe the application effect of health education based on Teach-back model in oral implant surgery patients.

**Methods** 480 patients who underwent oral implant surgery in our hospital from June 2023 to December 2023 were selected, and the patients were divided into the observation group ( $n=241$  cases) and the control group ( $n=239$  cases) based on the method of randomized numerical table. The control group adopted the traditional preoperative oral indoctrination method, and the observation group adopted the preoperative Teach-back combined with multimedia education method, with the same content. Comparison of the two groups of patients' health knowledge mastery, patient satisfaction scores, patient compliance.

**Results** The degree of health knowledge mastery, patient satisfaction and patient compliance of patients in the observation group was higher than that of the control group, and the difference was statistically significant.

**Conclusion** Health education based on the Teach-back model can effectively improve the degree of health knowledge mastery, patient satisfaction, and patient compliance of oral implant surgery patients.

**Keywords:** teach-back; dental implantation; patient education

### САЖЕТАК

**Увод/Циљ** Циљ је био да се испита ефекат примене едукације о здрављу на основу модела *teach-back* код пацијената који се подвргавају хирургији оралних имплантата.

**Метод** У студију је укључено 480 пацијената који су подвргнути хирургији оралних имплантата у нашој болници у периоду од јуна 2023. до децембра 2023. године. Пацијенти су методом случајне нумеричке табеле подељени у испитивану групу ( $n = 241$ ) и контролну групу ( $n = 239$ ). Контролна група је добила традиционалну преоперативну усмену едукацију, док је испитивана група добила преоперативну едукацију методом *teach-back* у комбинацији са мултимедијалним приступом, са истим садржајем. Поређени су резултати ове две групе у погледу усвојености здравствених знања, степена задовољства пацијената и њихове сарадљивости.

**Резултати** Степен усвојености здравствених знања, задовољства пацијената и сарадљивости био је већи у испитиваној групи у односу на контролну групу, при чему је разлика била статистички значајна.

**Закључак** Едукација о здрављу заснована на *teach-back* моделу може ефикасно да побољша усвојеност здравствених знања, задовољство пацијената и њихову сарадљивост код пацијената који се подвргавају хирургији оралних имплантата.

**Кључне речи:** *teach-back*; орални имплантати; едукација пацијената

## INTRODUCTION

Starting from April 20th, 2023, the financial burden on dental implant patients has significantly decreased after the implementation of centralized procurement prices for dental implant systems in China, lowering the barriers for patients to seek medical care, which has led to an expansion in the age and educational levels of the patients seeking treatment [1]. On the one hand, dental implants have become one of the mainstream options for tooth restoration, bringing a peak in implant surgeries for dental institutions. On the other hand, the national “Healthy China 2030” planning outline and the National Health Commission’s “Healthy Oral Action Plan (2019-2025)” emphasize the need to improve health promotion and education mechanisms, enhance the effectiveness of health education services, and promote the widespread dissemination

of health knowledge and the effective cultivation of health skills [2]. Therefore, it is of great significance to provide effective health education for patients undergoing implant surgery.

In recent years, various communication methods have gradually been introduced in the dental field, including Tell-Tell-Tell, Ask-Tell-Ask, and Teach-back, aiming to cultivate the personal skills of patients in managing their oral health [3]. Specifically, the Tell-Tell-Tell method is described as “the doctor's monologue”, primarily involving one-way information transmission from the doctor, lacking interaction with the patient [3]. By contrast, the Ask-Tell-Ask method uses a three-step format of “ask-inform-ask” to assess the information needs and understanding of patients, helping to meet their emotional needs [3]. However, the Teach-back method, as a more advantageous educational strategy, actively involves patients in the educational process by asking them to repeat or demonstrate what they have learned, significantly improving educational outcomes. In this regard, a systematic review by Yen and Leasure indicated Teach-back as an effective method for enhancing or providing health education for both children and adults [4]. Additionally, the Teach-back method has been recommended by various organizations, including the Joint Commission, the National Quality Forum, the Institute for Healthcare Improvement, and the Agency for Healthcare Research and Quality, as one of the effective methods for “comprehensive preventive measures” [5]. The application of Teach-back by Seely [6] in the informed consent process for surgical patients showed that this method helped both doctors and patients focus on key discussion points, ensuring that patients truly understood the information while improving their understanding of surgical risks. Moreover, after applying Teach-back to guide heart failure patients in disease-related knowledge and post-discharge continuity of health education, Vellone et al. [7] found a significant increase in patients' grasp of medical information and a reduction in readmission rates. In China, the Teach-back method was initially applied in the field of education, with its application in the medical field being relatively late. Since 2015, research on the application of the Teach-back method in health education has gradually increased, covering various diseases such as diabetes, hypertension, coronary heart disease, chronic obstructive pulmonary disease, malignant tumors, and orthopedic surgeries [8]. These studies have indicated that the Teach-back method can effectively enhance the health knowledge retention and compliance of patients.

However, despite the remarkable success of the Teach-back method in other medical fields, its application in dental implants remains limited. Traditional preoperative “oral indoctrination” in dental implants lacks standardization, personalization, and advancement, making it difficult to meet the comprehensive health knowledge needs of patients, ultimately resulting in poor

knowledge retention and low patient compliance [9]. By contrast, the Teach-back method employs a two-way information exchange model, emphasizing the learner's absorption and understanding of the educational content, thereby effectively enhancing the effectiveness of education [10]. Multimedia education uses images, animations, and videos to vividly and intuitively present the actual surgical process to patients, making it practical and engaging, with timely updates on information, which enables it to better meet the urgent information needs of patients as compared to traditional oral education methods [11]. Notably, simultaneous demonstration and presentation during education -- first informing patients about the main surgical process, the diagnostic and therapeutic instruments to be used, and the reasons for their use, followed by using the model and device to demonstrate the diagnostic and treatment process and working status, along with the possible sound, light, smell, and touch -- can alleviate patients' psychological anxiety. In this study, health education based on the Teach-back model was provided to 241 patients undergoing dental implant surgery at our hospital, aiming to improve the effectiveness of health education, fully meet the comprehensive health knowledge needs of patients, and enhance their patient compliance and satisfaction [12, 13].

## METHODS

### Clinical data

This study was approved by the Ethics Committee of our Hospital with all patients voluntarily signing informed consent forms. A total of 480 patients who underwent dental implant surgery at the Implant Center of our hospital from June to December 2023 were selected as study subjects. The patients were randomly divided into an observation group (n=241) and a control group (n=239) using a random number table. Inclusion criteria: ① Patients who met the surgical **indications** and received surgical treatment; ② Patients without mental disorders. Exclusion criteria: ① Patients unable to communicate normally; ② Patients without a smartphone and unaccompanied by family members; ③ Patients with combined organ dysfunction (heart, brain, kidney, etc.). This study was conducted in accordance with the Declaration of Helsinki and approved by the Research Ethics Committee of Shaoxing Stomatological Hospital (No.2025-2-1, Date: 04/02/2025), and written informed consent was obtained from all participants. All methods were carried out in accordance with relevant guidelines and regulations.

## Methods

In the control group, traditional oral indoctrination methods were used for preoperative education: After scheduling the surgery, outpatient nurses provided verbal health education, with the content as follows: preoperative precautions (cleaning teeth, avoiding colds, abstaining from smoking and alcohol, etc.), the surgical process, key points for intraoperative cooperation, and postoperative precautions (medication guidance, dietary guidance, oral care, follow-up appointment times, etc.).

In the observation group, the Teach-back method combined with multimedia education was used for preoperative education: After scheduling the surgery, patients were arranged in the preoperative education room at the Implant Center. For patients with mobility issues or poor comprehension, family members would accompany them, with the education provided by health education nurses.

### *(1) Multimedia Education*

The educational content, developed in accordance with relevant health education guidelines (such as "Health Guide for the Elderly in China"[14]) and tailored to oral implant surgery, was created by a team of prosthodontists, dental nurses, and geriatric specialists after reviewing clinical protocols and patient feedback. Made into 15-minute animated videos, they cover pre-operative (e.g., medication adjustments, caregiver arrangements), intraoperative (e.g., anesthesia steps, movement guidelines), and postoperative (e.g., incision care, soft food examples) details specific to implant procedures. The videos use 3D animations, live-action demos, and large-font subtitles with pinyin/dialect phonetics. Dialect versions (Cantonese, Shanghaiese, etc.) include region-specific food examples. Features like adjustable playback speed and repeat functions aid accessibility. Before the session, nurses check language preferences, play the videos, and pause for teach-back, helping patients grasp the knowledge effectively.

### *(2) Implementation of the Teach-Back Health Education Model*

The specific content was as follows: ① The nurses completed a 1-day training program on the precautions of the teach-back method (including theoretical courses on the principles of the teach-back method, role-playing with simulated patients, and receiving expert guidance during the initial clinical application). ② Education Explanation: Nurses explained the content again in simple and understandable language, demonstrating with models and instruments the surgical

processes such as implant insertion, screw closure, and healing abutment installation. Patients could touch some surgical instruments on-site and experience the noise produced by the surgical equipment; they also demonstrated oral care practices such as the Bass brushing technique and using mouthwash with a dental model. ③ Question Assessment: After the explanation, nurses used open-ended questions to ask patients to repeat or demonstrate the educational content, assessing their grasp of relevant knowledge. ④ Correction and Clarification: When patients repeated or demonstrated correctly, they were positively encouraged and praised, concluding the education session. If incorrect or incomplete, corrections and clarifications were provided, supplemented by revisiting weak areas through videos and on-site demonstrations. ⑤ Assessment Consolidation: Randomly selected knowledge points were questioned for re-evaluation and consolidation.

### Evaluation criteria

**Mastery of health knowledge:** A health education questionnaire created by our hospital for implant surgery was utilized, with a QR code generated using the SoJump software, allowing patients to scan and fill it out on-site after the preoperative education session (See Figure 1). The questionnaire covers four aspects: preoperative precautions, surgical process, intraoperative cooperation, and postoperative precautions, with a total of 10 items, and the specific content of the questionnaire can be viewed by scanning the QR code below. Each item is scored from 0-10 based on accuracy, with a total score of 100 points, and patients were categorized into 3 groups based on the results: fully mastered (>90 points), partially mastered (60-90 points), and not mastered (<60 points). Prior to formal use, the questionnaire underwent psychometric validation: content validity was assessed by the expert panel, resulting in a content validity index (CVI) of 0.92, indicating good relevance and comprehensiveness; internal consistency was tested with a Cronbach's  $\alpha$  coefficient of 0.87, demonstrating reliable internal consistency; and test-retest reliability was confirmed with an intraclass correlation coefficient (ICC) of 0.85 when administered to 30 patients at a 2-week interval, ensuring stable results over time. The mastery of oral implant health education content was calculated as follows:

Mastery = (Fully Mastered+Partially Mastered)/Total Number  $\times$  100%

### Patient satisfaction

The “Patient Satisfaction Survey for Preoperative Health Education in Implant Surgery” was developed by our hospital in accordance with the satisfaction indicators set by the National Health Commission, tailored to our hospital’s actual situation, which consisted of 9 items, including service attitude (4 items: whether patients are respected, proactive communication, patience in answering questions, and use of polite expressions), education experience (3 items: whether the methods are appropriate, content is comprehensive, and language is easy to understand), nurses' professional knowledge, psychological care, etc. Each item has four levels: very satisfied, relatively satisfied, not very satisfied, and very dissatisfied, scored as 100, 75, 50, and 0 points, respectively, and satisfaction assessments would be automatically sent to patients’ phones the day after the preoperative education session via SMS or WeChat through our hospital’s cloud follow-up satisfaction survey platform, which patients would fill out online before the cloud follow-up platform automatically calculated satisfaction based on the number of valid responses. Specifically, satisfaction was calculated as follows: Step 1: Each patient’s satisfaction score = Total score of items / Number of items; Step 2: Patient satisfaction for implant surgery = (Total patient satisfaction score / Total valid responses) [15].

### Patient compliance

The postoperative compliance behaviors of both groups of patients (pain management, medication following the doctor’s advice, avoiding spicy, hot, and hard foods, and proper oral care) were recorded through follow-ups via phone, so as to assess the patient compliance. Each nursing measure was categorized into 3 levels:

Fully compliant: Patients fully followed the medical advice without any deviations;

Partially compliant: Patients mostly followed the medical advice but had minor deviations (e.g., occasionally forgetting medication or slight dietary deviations);

Not Compliant: Patients did not follow the medical advice or had significant deviations (e.g., frequently consuming spicy foods, and not taking medication on time).

### Calculation method

Total Compliance Rate = (Number of Fully Compliant + Number of Partially Compliant) / Total Number × 100%

Fully Compliant Rate = Number of Fully Compliant / Total Number  $\times 100\%$

Partially Compliant Rate = Number of Partially Compliant / Total Number  $\times 100\%$

Not Compliant Rate = Number of Not Compliant / Total Number  $\times 100\%$

## Statistical methods

SPSS 19.0 software was used for data statistics, and measurement data following a normal distribution were expressed as ( $\bar{x} \pm s$ ), with inter-group comparisons performed using the independent samples t-test. Count data were represented as [n (%)] and inter-group comparisons were performed using the Chi-square test.  $P < 0.05$  was considered significantly different.

**Ethics:** This study was conducted in accordance with the Declaration of Helsinki and approved by the Research Ethics Committee of Shaoxing Stomatological Hospital, and written informed consent was obtained from all participants. All methods were carried out in accordance with relevant guidelines and regulations.

## RESULTS

### Comparison of general data between the two groups

Before performing the primary outcome analysis, the general data of the two groups of patients were compared to assess the effect of potential confounders on the results, including age, gender, education level, and cognitive level. The statistical analysis suggested no significant difference in age, gender, and education level between the control and observation groups ( $P > 0.05$ ), indicating inter-group comparability (see Table 1).

### Comparison of mastery of education content between the two groups

In terms of mastery of education content, the overall mastery of patients in the observation group was significantly higher than that in the control group ( $P < 0.001$ ). Specifically, the overall mastery of the control and observation groups was 154 (64.44%) and 220 (91.29%), respectively, with statistically significant differences ( $\chi^2 = 50.281$ ,  $P < 0.001$ ) (see Table 2).

### Comparison of patient satisfaction between the two groups

For patient satisfaction, the observation group reported significantly higher satisfaction than the control group ( $P < 0.05$ ). Specifically, satisfaction in the control and observation groups was



90.35% and 97.57%, respectively, and the differences were statistically significant ( $P < 0.05$ ) (see Table 3).

### Comparison of patient compliance between the two groups

When it came to patient compliance, the compliance of patients in the observation group was higher than that in the control group in 4 aspects of pain management (92.53% vs 78.66%,  $\chi^2 = 18.755$ ,  $P < 0.001$ ), medication following the doctor's advice (83.82% vs 69.87%,  $\chi^2 = 13.122$ ,  $p < 0.001$ ), avoiding spicy, hot, and hard foods (91.29% vs 76.15%,  $\chi^2 = 20.199$ ,  $p < 0.001$ ), and proper oral care (80.50% vs 70.71%,  $\chi^2 = 6.235$ ,  $p = 0.013$ ), with statistically significant difference ( $p < 0.05$ ) (see Table 4).

## DISCUSSION

In this study, the comparison between traditional health education methods and the Teach-back method combined with multimedia education found significant advantages of the Teach-back model in improving health knowledge mastery, patient satisfaction, and patient compliance among patients undergoing oral implant surgery.

Oral implant surgery is a complex dental treatment process, in which the lack of periodontal tissue around the implant makes it highly susceptible to pathogenic bacterial colonization and endotoxin invasion, leading to a decrease in local immune defense capability and triggering peri-implantitis, which directly threatens the short- and long-term survival of the implant [16]. Therefore, postoperative care is of great significance for the success of the surgery and the prognosis of patients. Nursing for dental implants includes strict oral hygiene maintenance, postoperative medication management, and dietary control. Meanwhile, these oral care abilities are related to the level of oral health knowledge, self-care ability, and patient compliance of patients. Therefore, it is essential to improve prognosis by enhancing the self-awareness of patients.

Additionally, the average age of patients was relatively high ( $49.88 \pm 14.678$  vs.  $47.61 \pm 15.117$  years) in this study, along with a low educational level (71.25% had a high school education or lower). In this regard, the traditional preoperative education method for dental implants relied on verbal indoctrination by nurses, which was monotonous and dull, largely overlooking the understanding and memory challenges faced by elderly patients and those with lower educational levels [17]. Moreover, patients often experience confusion, tension, and anxiety

preoperatively, which mitigate their ability to receive and master knowledge. In the control group, only 64.4% of patients could grasp the educational content, and their patient compliance was lower than that of the observation group, indicating the limited effectiveness of traditional health education methods for elderly and low-education patient populations. This result also highlights the necessity of optimizing educational methods. A more in - depth exploration through customized multimedia approaches can achieve better results in enhancing knowledge acquisition and compliance. Considerations can be made from the following two aspects: First, adjusting the complexity of multimedia content to suit different levels of health literacy - using simple visual presentations for low - literacy groups and providing detailed explanations for high - literacy groups - can improve understanding. Second, address language barriers by using multilingual subtitles or dubbing, and integrate specific contextual scenarios to address cultural differences.

According to Dale's Cone of Experience theory, people can remember only 10% of knowledge through reading, 20% through listening, 30% through viewing images, 50% when a demonstration is combined with listening, and up to 70% through participating in discussions [18]. In this study, a health education model was adopted based on the Teach-back method combined with multimedia, utilizing 30 to 60-second video push notifications that allow patients to acquire health education and self-care knowledge in a short period. Particularly, the videos can be watched repeatedly, helping patients identify gaps in their understanding and continuously enhance their awareness of their condition and care. This intuitive, vivid, and illustrative presentation method effectively increases patient engagement, encouraging them to recite and express the health education content. In the meantime, nurses can assess patients' understanding in real-time, addressing their questions on-site and providing reinforcement, thereby offering timely and accurate guidance. This increases patients' ability to receive and master knowledge, enabling them to better follow medical advice for self-management postoperatively, ultimately achieving better surgical outcomes and increasing patient satisfaction. Compared to other research findings, this study further confirms the effectiveness of the Teach-back model in specific patient populations. For instance, Chen et al. [19] implemented the Teach-back method for health education in patients with diabetes and periodontal disease, finding significant relief of periodontal issues and marked improvements in disease-related knowledge and self-care abilities. Moreover, Lei et al. [20] used Teach-back health education in patients with chronic periodontal disease, which helped maintain oral hygiene and reduce plaque indices. These findings align with this study, indicating that the Teach-back model significantly enhances patients'

mastery of health knowledge and patient compliance, particularly among elderly and low-education populations.

However, this study also has certain limitations. First, additional time may be required for the implementation of the Teach-back model to ensure patients fully understand all important information, which could be a challenge for busy healthcare institutions, especially in resource-limited settings. Second, this study primarily focused on short-term health education outcomes, without evaluating the impact on long-term health outcomes. In this regard, the effects of the Teach-back model on long-term health outcomes, such as postoperative quality of life and complications, should be further investigated in future research. Additionally, patient characteristics such as health literacy, educational background, and cultural differences should also be considered in future research, as these factors may impact the effectiveness of the Teach-back model. Finally, the study is conducted at a single center, which limits the universality of the research conclusions. The patient cohort of this study reflects the specific demographic characteristics and clinical background of this single institution, and the availability of resources also differs from other environments. Therefore, the effectiveness of traditional preoperative education observed here may deviate to some extent from the results of centers with diverse patient populations or different resource allocations. Caution is needed when widely expanding these results.

## CONCLUSION

The implementation of health education based on the teach-back model for patients undergoing oral implant surgery can provide more specialized and standardized educational content, helping patients truly understand relevant health knowledge and improving their mastery of health information. This, in turn, enhances their patient compliance, encourages them to actively cooperate with treatment, increases patient satisfaction, and effectively prevents conflicts between patients and healthcare providers. Therefore, this approach is of significant value in clinical application and is worthy of being promoted and applied.

**Conflict of interest:** None declared.

## Author contributions

Study design: Zhang SY, Zhou YY;

Data acquisition: Zhang SY, Zhou YY;

Data analysis and interpretation: Zhang SY, Zhou YY;

Manuscript preparation: Zhang SY, Zhou YY;

Critical revision of the manuscript for intellectual content: Zhang SY, Zhou YY;

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**Table 1.** Comparison of general data between the two groups

Item	Control group (n = 239)	Observation group (n = 241)	Statistics	p
Age/years	49.88 ± 14.678	47.61 ± 15.117	1.668 <sup>1</sup>	0.096
Sex; n (%)			0.000 <sup>2</sup>	0.992
M	107 (44.77)	108 (44.81)		
F	132 (55.23)	133 (55.19)		
Education level/n (%)			1.328 <sup>2</sup>	0.249
High school or below	176 (73.64)	166 (68.88)		
College or above	63 (26.36)	75 (31.12)		

<sup>1</sup>t value;<sup>2</sup> $\chi^2$  value

**Table 2.** Comparison of mastery of education content between the two groups [n (%)]

Group	n	Not mastered	Partially mastered	Fully mastered	Overall mastery
Control	239	85 (35.56)	113 (47.28)	41 (17.15)	154 (64.44)
Observation	241	21 (8.71)	65 (26.97)	155 (64.32)	220(91.29)
$\chi^2$					50.281
p					< 0.001

**Table 3.** Comparison of patient satisfaction between the two groups [n (%)]

Group	SMS sent	Valid responses	Patient satisfaction
Control	239	225	90.35
Observation	241	238	97.57

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**Table 4.** Comparison of patient compliance between the two groups [n (%)]

Group		Control	Observation	$\chi^2$	p
n		239	241		
Pain management	Fully compliant	88 (36.82)	131 (54.36)		
	Partially compliant	100 (41.84)	92 (38.17)		
	Not compliant	51 (21.34)	18 (7.47)		
	Overall compliance	188 (78.66)	223 (92.53)	18.755	< 0.001
Medication following the doctor's advice	Fully compliant	130 (54.39)	170 (70.54)		
	Partially compliant	37 (15.48)	32 (13.28)		
	Not compliant	72 (30.13)	39 (16.18)		
	Overall compliance	167 (69.87)	202 (83.82)	13.122	< 0.001
Avoiding spicy/hot/hard foods	Fully compliant	127 (53.14)	158 (65.56)		
	Partially compliant	55 (23.01)	62 (25.73)		
	Not compliant	57 (23.85)	21 (8.71)		
	Overall compliance	182 (76.15)	220 (91.29)	20.199	< 0.001
Proper dental care	Fully compliant	80 (33.47)	134 (55.6)		
	Partially compliant	89 (37.24)	60 (24.9)		
	Not compliant	70 (29.29)	47 (19.5)		
	Overall compliance	169 (70.71)	194 (80.5)	6.235	0.013



**Figure 1.** Health education questionnaire for implant surgery

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