

## Original Research Article

# A qualitative study on factors that influence the degree of comfort experienced by patients undergoing respiratory endoscopy in combination with intravenous injections of remimazolam besylate and fentanyl

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### Abstract

**Purpose:** To investigate the level of discomfort in patients undergoing respiratory endoscopy in order to provide experimental evidence for the formulation of a comfort assessment scale for this procedure, and for guiding future research and intervention measures.

**Methods:** Using the phenomenological research method of qualitative research, semi-structured interviews were conducted with 18 patients who underwent respiratory endoscopy in the Respiratory Intervention Center of the Fourth Affiliated Hospital of Zhejiang University School of Medicine. The interview data were analyzed, and the theme was extracted using the Colaizzi 7-step analysis method. During the surgery, remimazolam besylate (intravenous injection, 5 - 7.5 mg) was used in combination with fentanyl (intravenous injection, 1 - 2 µg/kg) for flexible bronchoscopy examination.

**Results:** From the interview data, 3 themes and 9 sub-themes that affect the comfort of patients undergoing respiratory endoscopic surgery were identified. These comprised individual factors (fear and worry about the outcome), family factors (family financial difficulties and lack of care from family), and medical care factors (attitude of medical caregivers, insufficient health education, unreasonable operation arrangements, inconvenient care, and surgical complications).

**Conclusion:** Patients undergoing respiratory endoscopy experience a higher degree of comfort when remimazolam besylate is used in combination with fentanyl. Medical staff should correctly identify the sources of discomfort in patients undergoing respiratory endoscopy under general anesthesia, and provide targeted interventions to improve the comfort experienced. Moreover, the quality of service provided by medical staff should be improved.

**Keywords:** Respiratory endoscopy, Comfort experience, Qualitative research

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## INTRODUCTION

Respiratory endoscopy which enhances internal visualization of respiratory organs, has been

widely used in the diagnosis and treatment of respiratory diseases [1]. Respiratory endoscopy is associated with advantages such as small size, fast recovery, ease of operation, and a high

degree of accuracy [2]. However, respiratory endoscopy for preoperative anesthesia may cause complications such as respiratory depression, aspiration and reflux [3,4]. These changes are not conducive to smooth operation, resulting in negative effects on success rate of respiratory endoscopy and treatment outcome. However, appropriate sedation through general anesthesia improves the safety and comfort of patients receiving flexible bronchoscopy, and its application in clinical practice is increasing [5].

Remimazolam besylate is a new type of benzodiazepine which is an ultra-short-acting GABA receptor agonist. Relative to any other intravenous sedative drug (e.g., propofol), its advantages lie in mild respiratory depression, stable hemodynamics, low incidence of intravenous pain, and zero accumulation in the body [6].

Recent studies have shown that the implementation of nursing intervention is beneficial to the outcome in patients undergoing respiratory endoscopy [7]. However, since most of the studies were focused on quantitative research, there are no extant qualitative investigations on the comfort/discomfort experienced by patients undergoing respiratory endoscopy and the factors involved. It is not practicable for a single scale to fully capture the experience of patients undergoing respiratory endoscopy. Moreover, there is a dearth of research on the impact of social and cultural factors on the experience of patients undergoing respiratory endoscopy in China.

Therefore, in the present study, a qualitative research method was used to investigate the impact of respiratory endoscopy on the comfort of patients. It is expected that these factors will provide a basic reference for subsequent development of a scientific, effective and suitable comfort assessment scale for patients undergoing respiratory endoscopy in China. Moreover, the identified factors will provide a guide for targeted interventions in clinical practice, while improving patient compliance and comfort.

## METHODS

### Subjects

This study was conducted at the Respiratory Intervention Center of the Fourth Affiliated Hospital of Zhejiang University School of Medicine, China, from October 2022 to December 2022. Targeted sampling method was

used to select patients who underwent respiratory endoscopy, for an interview [8].

### Inclusion criteria

The included patients were those who underwent respiratory endoscopy, patients who were conscious, coherent and logical; subjects aged  $\geq 14$  years, patients without a history of mental illness, and patients in American Society of Anesthesiologists (ASA) class II or III.

### Exclusion criteria

Patients with impairment in hearing, speech or consciousness; those who showed poor compliance; those who were allergic or contraindicated to the drugs used in the examination; patients who had severe organ diseases affecting the heart, brain, lung, and liver or kidney, and patients who had a history of metabolic diseases.

The sample size used for the interview was based on the principles of data repetition and information saturation [9]. The population comprised 9 males and 9 females aged 35 - 80 years, with a mean age of  $62.94 \pm 10.75$  years.

### Ethical consideration

The data of the interviewed patients were treated anonymously. Ethical approval for this study was obtained from The Fourth Affiliated Hospital, Zhejiang University School of Medicine (approval no. K2022165) and all procedures were performed following the guidelines of the Declaration of Helsinki [10].

### Pre-examination

In this study, before the examination, the nurse in the endoscopy room gave the patient a 2 % lidocaine injection for 15 min *via* atomized inhalation. At the beginning of the examination, fentanyl and remimazolam besylate were slowly injected intravenously at doses of 1 - 2  $\mu\text{g}/\text{kg}$  and 5 - 7.5 mg, respectively. Following insertion of the bronchoscope into the glottis by the respiratory endoscopist, a small amount of 2 % lidocaine was sprayed locally on the carina, left main bronchus, and right main bronchus.

### Interview outline

The Husserl descriptive phenomenological research method in qualitative research was used in this study [11]. It was focused on the experiences of the interviewees. A preliminary interview outline was developed through

preliminary literature analysis and group discussion on the research purpose, and a pre-interview was conducted with two patients. Then, the interview outline was adjusted in line with results of the preliminary interview and expert opinions. The final interview outline contained 7 selected questions, viz:

*Please, describe your current feelings about respiratory endoscopy.*

*Which of the following issues are you most concerned about in respiratory endoscopy – pain, mood, attitude of medical staff, financial issues, anesthesia drug, technique used, and results?*

*Please, describe your psychological and physical feelings after bronchoscopy.*

*Do you feel that the experience is different from your expectations?*

*From your point of view, what areas do you think should be improved upon?*

*How do the patient's family members see the patient's respiratory endoscopy, and how do they feel about it?*

*Do the patient and family members have any other questions that need to be included?*

### Data collection

This study obtained data through semi-structured interviews. Study method was added, based on specific situations [12]. The interviewer informed the patient about the research purpose, significance and measures taken to protect the patient's privacy. Informed consent was obtained from each of the patients. The interview was conducted either at the ward, respiratory intervention center, or resuscitation center. Only the interviewer and the patient were present during the interview. Under special circumstances, the patient's family members were also interviewed either physically or via the telephone. The interview was conducted by a nurse with effective communication skills. Care was taken to ensure that the selected interviewer was neutral and free from prejudice. Moreover, the interviewer asked the questions without any attempts to induce answers from the patients. The responses to the questions were carefully recorded with a recording pen. The interview time for each patient was controlled to 30 min, and the interview recordings were converted into text format within 24 h. All data were backed up to prevent loss.

### Statistical analysis

Colaizzi's 7-step analysis method [13] was used for analysis of the interview data. All the data were carefully studied and arranged. Then, important statements and responses were extracted from the text data, especially primary

themes. The primary themes were identified and coded, and detailed and complete descriptions were prepared for each theme. Primary themes with similar views were identified. Core themes were extracted and confirmed by verification from the interviewed patients. Two team members used the same method to analyze and compare the data, and the codes and themes were discussed by the team so as to arrive at consensus.

## RESULTS

The general data of the interviewed patients are shown in Table 1. The process used in development of the theme is shown in Figure 1.

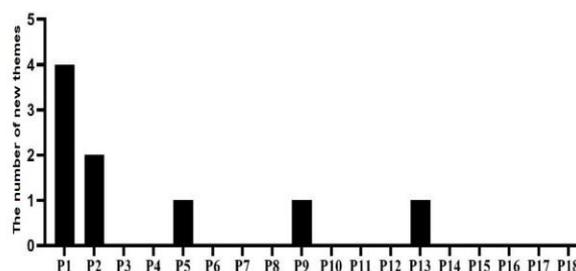


Figure 1: Diagram of theme development process

### Factors that affect the comfort experienced by patients undergoing respiratory endoscopy

Through the analysis of the interview data, the factors that affect the patient's comfort during respiratory endoscopy were summarized into 3 themes. The themes and sub-themes are presented in Table 2.

#### Personal factors

##### Fear

Some patients who had done one or more respiratory endoscopic examinations in the past, and patients who heard about the procedure from doctors and nurses expressed willingness to accept the examination and to cooperate during the process. However, some patients were worried about pain associated with bronchoscopy, resulting in nervousness and fear. For example, P7 said: "I did it in Hangzhou before, and I feel that it is worse than death. I have been worried since yesterday." For P11 "I did it in Shanghai. I felt uncomfortable when I did it. I dare not do it for the second time." Some patients felt nervous and scared because they did not understand bronchoscopy and anesthesia.

**Table 1:** General data sheet of interviewed patients

Gender	Age (years)	Diagnosis at admission	Marital status	Employment	Educational background
Female	62	Right pleural effusion	Widowed	Migrant worker	Primary school
Female	80	Small Cell Lung Cancer	Widowed	Retired	High School
Male	50	Squamous cell Carcinoma of the left lung	Married	Worker	Community College
Male	69	Right lung squamous cell carcinoma	Married	Retired	Primary school
Male	73	Lung adenocarcinoma Stage IV	Married	Retired	Primary school
Male	64	Lung infection	Married	Retired	High School
Female	74	Cryptogenic organizing pneumonia	Widowed	Retired	Middle School
Male	35	Lung infection	Married	Worker	Bachelor
Female	57	Adenosquamous cell carcinoma of the lung	Married	Self-employed	High School
Female	67	Lung infection	Married	Retired	High School
Female	56	Lung infection	Married	Worker	Community College
Female	70	Lung adenocarcinoma	Widowed	Retired	Primary school
Female	63	Bronchiectasis with infection	Married	Retired	High School
Male	69	Squamous cell carcinoma of the lung	Married	Retired	Middle School
Male	52	Pulmonary shadow Right lung	Married	Self-employed	High School
Female	58	adenocarcinoma with metastasis	Married	Retired	Middle School
Male	74	Pulmonary Shadow	Widowed	Retired	High School
Male	60	Lung space occupying pending inspection	Married	Migrant worker	Primary school

**Table 2:** Factors that affect the comfort experienced by patients undergoing respiratory endoscopy (n=18)

Theme	Sub-theme	Frequency of occurrence (n)	Percentage (%)	Rank
Personal factors	Fear	11	61.11	3
	Worry about the results	14	77.78	1
Family factors	Lack of family care	2	11.11	8
	Family financial difficulties	2	11.11	9
Medical care factors	Attitude of medical service providers	8	44.44	4
	Insufficient health education	6	33.33	5
	Unreasonable operation arrangements	5	27.78	6
	Inconvenient care	4	22.22	7
	Surgical complications	13	72.22	2

For example, P6 said: "I experienced nervousness all the time, and I felt a little afraid. I was afraid that anesthesia would be used because it has side effects." Some of the patients were afraid of the hospital, e.g., P18 who said: "This test is a little scary. I have never been to the hospital. I came to the hospital just to see a doctor. I am scared." Some patients had fears due to illness and changes in family. For example, P1, said: "I do not know how the water was hidden here. So much water was hidden. I was afraid. My daughter asked me to do it, but I

did not want to do it. My husband died last year, and I am alone this year. I am afraid of doing this respiratory endoscopy."

### Worry about the results

The results of respiratory endoscopy constitute an issue of most concern for patients. In this study, more than half of the patients indicated that they wanted to know the outcomes of their examinations, and hoped that they would achieve the desired results after respiratory

endoscopy. For example, p10 said: *"You are said to be an authority in respiratory endoscopy. Therefore, I am not worried at all, and I am not worried about any problems with this examination."* In a similar vein, P11 said: *"Just do it in a better way for me. Be lighter. Do it better, and be more careful"*. P15 admonished: *"In short, just do it in a better way for me, and avoid any accidents"*. Similarly, P2 said: *"I hope it will be better this time."* Patient P4 was also hopeful: *"Help me clean up the things that can be cleaned up in the trachea"*, while P18 said: *"Everything else is fine, but I do not know how the test results will be when the test results will come out, and if there is no problem in the test. I am satisfied with everything."*

## Family factors

### Lack of family care

The family is an important part of social support. Good family support helps patients and improves their quality of life. In this study, the family members provided the patients with the necessary care and helped them handle necessary hospitalization and inspection procedures. Two interviewees talked about having difficulties with family care: P1 said: *"My family is not doing well, and my daughter-in-law does not take care of me. My son used to keep me company for a couple of days. After a while, my son told me that my daughter was more suited for the task of staying with me. However, my daughter is not free either, and my son-in-law owns a restaurant. Thus, no one in the family takes care of me, and I do not want to do this inspection."* The other patient P5 said: *"None of my sons is filial, and I am too old. What is the use of doing this respiratory endoscopy? I do not want to do it, whether it means life or death."*

### Family financial difficulties

Although respiratory endoscopy has been included in medical insurance in China, some patients still feel anxious and reluctant, either because medical insurance in different places cannot be reimbursed immediately, or because some test results have to be paid for by them. For example, P1 complained: *"I said that we do not have any money. My son does not earn any money. I don't want to do this examination if I do not have money. Today, I feel that all the 2,800 yuan has been spent. All the money has been spent. I am afraid because it is not good to be in debt."* Similarly, P17 said: *"If I get cancer, I would not have the money to treat it, and my family's conditions are not good. So, I do not even want to have this test."*

## Medical care factors

### Attitude of medical care providers

Studies have shown that the implementation of psychological care for patients undergoing respiratory endoscopy effectively improves the patients' psychological status and compliance, and reduces the incidence of adverse reactions [14]. Improved quality of service such as preoperative visits significantly relieves anxiety in patients. Motivational interventions maintain the stability of vital signs of patients during the peri-examination period and reduce the operation time of the examination. Thus, appropriate emotional support for patients by medical staff effectively reduces negative emotions in patients. About 44.44 % of the patients in this study talked about the care and services provided by the medical staff, which made them feel at ease. For example, P2 said: *"I have nothing to worry about because you nurses are very concerned about me."* Expressing satisfaction, P4 said: *"You all made it so good. The service is very good. I am not worried at all, not at all."* Some patients also expressed their hope that the medical staff would improve their service, such as P15: *"I hope your service will be better and that you show more enthusiasm about taking care of me."*

### Insufficient health education

Patients' fear of respiratory endoscopic surgery may often be attributed to ignorance due to many reasons: low educational background, insufficient cognitive ability, as well as limited access to information. Health education by nurses is an important means of correcting lack of knowledge in patients. For example, P10 said: *"You have all explained to me clearly, and your attitude is very good. I am very satisfied, and there is nothing for me to worry about."*

Before and after the whole respiratory endoscopic surgery, it is of utmost importance to give health education to the patients. Insufficient health education negatively affects the treatment and the patients. For example, P15 said: *"I was going to do respiratory endoscopy yesterday, but I could not do it because I ate a meal. I did not know that I was supposed to fast. The nurse said that she told me to fast, but I did not remember. Alas, I am not in the mood now."*

### Unreasonable scheduling of surgery

Patients must fast from food and water before respiratory endoscopy. Late scheduling of respiratory endoscopy is an independent risk factor for failure of fasting. It is an unreasonable

examination schedule that not only affects smooth implementation of the procedure but also affects the mood and level of comfort of the patient. Some patients complained about the long duration of waiting before the examination. For example, P14 stated: *"I want to do it early because if it is done early, it will be completed early. I was annoyed by long duration of waiting."* For P16: *"It took a long time to start. Originally, I made an appointment for the morning, but then the examination started at noon."*

Moreover, some patients waited for so long in the fasting state that they felt hungry and uncomfortable, for example P18 who complained: *"When I came down, I knew I was hungry. I could not eat until 3:30 pm. I just felt very hungry. People were about to faint from starvation. The feeling was that of starving to death."*

### **Inconvenience of care**

Since the outbreak of the Covid-19 epidemic, the coordination of the relationship between epidemic prevention and control, and saving lives has been a difficult problem. In this study, some patients mentioned that the early diagnosis and treatment of the disease were delayed due to the prevention and control of the COVID-19 epidemic in the hospital. Patient P4 complained: *"The cough is severe. This epidemic has been going on for a long time, and I could not go out. It has been too long. I have not come to the hospital to get infected."*

Some interviewees were nervous while waiting for the respiratory endoscopy. Due to the prevention and control of the epidemic, family members of the patients could not follow them to the respiratory intervention center to wait. According to P12: *"In my current mood, I just want someone to come in to accompany me, but the nurse said that because of the epidemic prevention and control regulations, family members cannot be allowed in."* Similarly, P14 said: *"I want my daughter to come in and accompany me so that I can feel at ease."*

A patient complained that although the attitude and service provided were good, his family were not allowed to come in to take care of him and that it was a bit inconvenient for him to be alone in the hospital.

### **Surgical complications**

Anesthesia may be routinely administered before respiratory endoscopy, but due to drug effects and individual factors, some adverse reactions

often occur, thereby affecting the comfort of patients [15,16]. On waking up, most patients indicated that they had no obvious discomfort. For example, P13 said: *"I am very comfortable, but a little hungry"*, while P14 said: *"Very comfortable, no bad feeling at all."* However, some patients expressed physical discomfort, for example, P7 stated: *"Before the examination, water was poured in, and I was asked to swallow it. They said it was an anesthetic, which was uncomfortable. I felt a mouthful of phlegm in my throat."* For P8: *"I woke up naturally after the gastroscopy, but after the respiratory endoscopy, I could not wake up from anesthesia and I was very tired"*, while P3 said: *"You said that the cough is normal and that after taking the anesthetic, I will be fine. Anyway, now I am coughing up to my neck, and I cannot stop. I keep coughing."*

Respiratory endoscopy is an invasive operation, and patients are prone to stress reactions. They may have symptoms of breathlessness, coughing up phlegm, and blood streaks, all of which affect the patient's comfort. For example, family members of P4 said: *"He is coughing now, and there is blood when he coughs. The blood is not much, but every time he coughs, there is blood, and he looks a little scared."* Moreover, P8 complained: *"After the treatment, I felt uncomfortable in my nasal cavity and nose. At that time, a tube was inserted into my nose, and I was very uncomfortable."* A family member of P16 said: *"After the operation, he said that his throat was very painful."*

## **DISCUSSION**

In this study, 61.11 % of patients showed fear. Therefore, there is need to strengthen psychological care for patients. Nursing staff are very crucial in the implementation of psychological care. The language used by nurses and the behavior of nurses have important impacts on patients [17]. In order to ensure a comfortable and safe environment for patients, there is need to increase communication with patients by giving them health education related to respiratory endoscopy so as to increase patients' understanding of the procedure and reduce tension and anxiety. If necessary, relaxation therapy, listening to music and other measures may be used to relieve tension. The patients should be encouraged by providing information on previous successful cases of respiratory endoscopic surgery. This will increase patients' confidence in the procedure. However, to accomplish this, the nursing staff should have a

high reservoir of professional knowledge, sense of responsibility, and empathy.

This study showed that lack of family support during disease treatment leads to lack of confidence in patients. Good social support involves family support which enhances the psychological resilience of patients and reduces negative emotions [18]. Therefore, while providing health education to patients, nursing staff should let the patients' families understand the importance of family support to patients, and encourage family members to give support in thought and action. In terms of economy, there is need to improve the medical insurance system, open remote or inter-provincial medical insurance reimbursement offices, increase medical insurance reimbursement, and reduce the financial burden and psychological pressure on patients. Due to the use of analgesic and sedative drugs during the examination, patients must fast for not less than 4 h before painless respiratory endoscopy, and for 6 h after surgery [19]. Specific fasting plans may be formulated in line with the patient's examination schedule. Early fasting leads to hunger or even hypoglycemia due to long-term fasting after surgery. The patient should wait within half an hour to the scheduled examination time. The patient should not be made to wait for too long, since this negatively affects mood. Explaining and gaining the patient's understanding may help to reduce restlessness and anxiety. The techniques involved in respiratory endoscopy should be improved. The patients should be informed of the likely adverse reactions to anesthesia drugs before undergoing respiratory endoscopy, as well as the possible discomforting reactions after the operation, such as cough, hemoptysis, dizziness, nausea, sore throat, and nasal cavity pain. The patients should be made to understand that these are normal reactions and that there is no need to worry too much about them. Patients with severe reactions may report to a doctor for symptomatic treatment.

Respiratory endoscopy, being an invasive operation, has very high requirements for skilled physicians. Hence, it should be performed after confirming that the anesthetic effect is good, otherwise laryngeal endoscopy may occur [20]. For adverse reactions such as convulsions and bronchospasm, physicians should operate gently and skillfully, and shorten the examination time as much as possible so as to reduce mechanical damage to the airway. Endoscope disinfection and strict aseptic procedures should be performed to avoid surgical infection. The results of postoperative examination should be discussed with the family members of the patient,

depending on the patient's personality characteristics and psychological endurance. The patient should be informed of the results carefully and selectively. For patients in poor conditions and poor prognosis, full care and empathy should be given. Patients should be encouraged to cooperate with family members to provide support so that they can actively cooperate with follow-up treatment.

### **Limitations of this study**

Proficiency in application of qualitative research methods and the mastery of techniques for extraction and summarization of information from existing materials are still relatively weak. This study is merely an introductory investigation into the psychological factors associated with comfort during the administration of analgesic and sedative drugs in patients undergoing respiratory endoscopy. However, the study lacks support from quantitative research data. The conclusions from this research cannot be generalized until they are validated in clinical practice. The small sample size makes it difficult to assert that the conclusions are representative of this group of patients. Although this is a characteristic feature of qualitative research, from the perspective of scientific research paradigms, it lacks rigor.

### **CONCLUSION**

Patients experience high degree of comfort when remimazolam besylate is used in combination with fentanyl during operation. Due to the illness, patients are prone to negative emotions such as tension, anxiety, and depression. They worry about adverse reactions to respiratory endoscopy and examination results, as well as inadequacies in social and family support. Nursing staff should be keenly aware of these problems and should offer appropriate psychological interventions through high-quality services. These will improve the comfort of patients undergoing respiratory endoscopy and enhance their confidence in the treatment procedure.

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### Ethical approval

None provided.

### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Conflict of Interest

No conflict of interest associated with this work.

### Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them. Tao Jiang designed the study, supervised the data collection, and analyzed the data. Chaojuan Yang interpreted the data and prepared the manuscript for publication. Chaojuan Yang, Chengying Kong, Leying Jin, Li Yang and Danmeng Peng supervised the data collection, analyzed the data and reviewed the draft of the manuscript.

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