Effects of standardized health education pathway on patients undergoing endobronchial ultrasound-guided transbronchial needle aspiration

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Abstract

Background: To explore the application and effect of standardized health education pathway in patients undergoing EBUS-TNBA.

Methods: Hundred and one patients undergoing EBUS-TBNA for the first time from September 2017 to June 2018 were divided into the study group and the control group. Patients in the control group (n = 50) received routine health education, while those in the study group (n = 51) received health education intervention based on the standardized health education pathway. Differences of anxiety, heart rate and oxygen saturation recovery time, success rate of first intubation attempt, and patient satisfaction between the two groups were observed.

Results: Basic information of patients in the two groups was comparable (P > .05). The SAS scores of the recovery time of heart rate and oxygen saturation in the study group were observably lower than those in the control group (P < .05), while the success rate of first intubation attempt and the satisfaction rate of the patients in the study group were remarkably higher (P < .05).

Conclusion: Health education based on the standardized pathway can reduce the anxiety level of patients undergoing EBUS-TNBA, reduce the operation time, and improve the success rate of first intubation attempt as well as the satisfaction of patients.

KEYWORDS
EBUS-TNBA, effect, health education, standardized pathway

1 | INTRODUCTION

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is the latest minimally invasive technique for the diagnosis and treatment of hilar and mediastinal lesions. With an ultrasonic miniprobe at the front end of the electronic bronchoscope, EBUS-TBNA can enable real-time ultrasound scan of lesions on the wall of the respiratory tract and adjacent areas, so that the operator can perform ultrasound-guided diagnosis and treatment of lesions accurately and safely. Indications for EBUS-TBNA are: (a) lymph node staging in lung cancer patients; (b) diagnosis of intrapulmonary tumors; (c) diagnosis of unknown hilar and/or mediastinal lesions.
mediastinal lymphadenopathy; and (d) diagnosis of mediastinal tumors.\(^2\)

Due to its strong irritation to the trachea, patients often have obvious discomfort, resulting in patients’ anxiety, tension (or even fear) and resistance, as well as behavioral changes, and thus in the failure to well coordinate with the examination. Some researchers\(^3\) reported that the targeted medical knowledge and health education can reduce patient anxiety, shorten hospital stay, improve the success rate of bronchoscopy, reduce the incidence of complications, improve patients’ satisfaction and trust. Thus, it is fundamental to be aware of the implementation of standardized health education on tracheoscopy.

Since the concept of clinical nursing pathway was introduced into China, it has been applied to the health education of patients and has achieved good results.\(^4-6\) Based on growing empirical evidence for clinical efficacy of health education management, standardized education programs as well as guidelines and recommendations for quality management in health care practice have been developed. Sun et al\(^7,8\) applied health education pathway to needle aspiration biopsy guided by ultrasound bronchoscope to patients, thus improving the cognition and compliance, reducing bad mood and relieving tension, and effectively reducing adverse reactions and postoperative complications. In order to improve the knowledge and compliance of patients about EBUS-TBNA and alleviate their negative feelings, standardized health education pathway was applied in this study to intervene patients undergoing EBUS-TBNA from September 2017 to June 2018.

2 | METHODS

2.1 | Study subjects

A total of 101 patients who were eligible for the inclusion criteria were enrolled and underwent EBUS-TBNA examination for the first time in the endoscopic diagnosis and treatment center of a tertiary hospital from September 2017 to June 2018. Among them, patients from September 2017 to January 2018 were included in the control group, and those from February to June 2018 were placed in the study group. The subjects met the following inclusion criteria: (a) undergoing EBUS-TBNA examination for the first time; (b) age: 18-75; (c) clear in consciousness with good mental health; (d) able to read or express their ideas; and (e) willing to participate in this study. Exclusion criteria: severe cardiopulmonary disease and coagulation dysfunction. This study was approved by the hospital ethics committee (Ethical number: 2018350). All patients signed the informed consent forms prior to the examination.

2.2 | Study interventions

2.2.1 | Control group

Patients in the control group received routine health education, which was list on a sheet, mainly including the endoscopy notice from nurses for preexamination preparations such as fasting, completing electrocardiogram and coagulation tests on time, and checking instructions of the drugs needed for the morning of the examination day; reminders from the ward nurses the night before examination about fasting in the next morning; and the explanations from endoscopy nurses about diet, self-observation and the time to obtain the report after examination.

2.2.2 | Study group

We established the standardized health education pathway form for patients undergoing EBUS-TBNA (Table 1), and carried out the standardized health education according to the form strictly.

Approaches for standardized health education pathway establishment

1. Literature review: Relevant literature concerning bronchoscopy, health education, EBUS-TBNA, nursing pathway, and standardized health education were studied to understand the research trends in related fields, the content of health education pathway was clarified, and preliminary standardized health education pathway form in combination with the survey of the health education needs from patients undergoing EBUS-TBNA was established.

2. Expert consultation: After the standardized health education pathway form for patients undergoing EBUS-TBNA was completed, two medical and seven nursing experts were selected to discuss, evaluate and revise the contents of the health education pathway of EBUS-TBNA. All experts should be willing to participate in this study. The experts discussed the contents as well as the systematicness, professionalism and feasibility of the pathway form in depth. In the first round of panel discussion, experts suggested some introduction to the surgeon as well as instructive words of guidance to take a deep breath when patients undergoing EBUS-TBNA should be listed in the pathway form. Also, feedback education concept should be applied by evaluating the mastery of previous educating contents and the preparation work, and should thus be reflected in the pathway form. Based on the above opinions, the pathway form was re-reviewed. After the second round of panel discussion, nine experts agreed on the contents of the form, and the standardized health education pathway form for patients undergoing EBUS-TBNA was preliminarily established.

3. Clinical application: The clinical trial was carried out by the investigators in five patients undergoing EBUS-TBNA. Results showed that the contents of the health education pathway form were in accordance with the routine nursing of EBUS-TBNA examination, and were consistent with the needs of patients for health education in terms of time and content. And, after the trial, the patients’ opinion such as intervention measures assisting patients’ sleep and instruction of silver ion spray to alleviate the laryngeal discomfort after examination, were listed in the pathway form.
| Health education contents                                                                                                                                                                                                 | Executor |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 1. Introduce the environment, layout and equipment of the bronchoscopy room, and explain the safety measures during examination (appointment)                                                                           | √        |
| 2. Introduce the respiratory endoscopy operation doctors and nurses, and enhance the trust of the patients in the medical staff (appointment)                                                                                 | √        |
| 3. Explain the purpose, significance, cost, method and procedures of EBUS-TBNA examination according to the anatomical map of the respiratory system (appointment)                                                             | √        |
| 4. Watch the deep breath training video to guide the cooperation for endoscopic insertion: deep breathing (appointment)                                                                                                    | √        |
| 5. Manifestations and coping methods of common discomfort during examination, such as: (1) nasal foreign body sensation and itch: psychological comfort and diversion of attention; (2) nausea and retch: pause operation and provide psychological comfort; (3) asphyxiation and severe cough: guide the patient to relax as much as possible; do not pull out the bronchoscope with hand, and perform abdominal breathing; if necessary, the patient can signal the medical staff to pause (appointment) | √        |
| 6. Inform the patient to fast for 4 to 6 h before examination, and emphasize the importance of fasting (appointment)                                                                                                    | √        |
| 7. Evaluate the medical history and medication status of the patients; patients with hypertension continue to take antihypertensive drugs in the morning, while those with diabetes suspend hypoglycemic drugs once (appointment) | √        |
| 8. Evaluate the psychological state of the patients, carry out psychological counseling, and provide the patients with reference methods for self-relaxation (appointment)                                                          | √        |
| 9. Guide the patients to complete relevant tests, such as blood routine, coagulation time, eight immune items and electrocardiogram (before examination)                                                                        | √        |
| 10. Evaluate the completeness of the examination of the patients, and communicate with the competent doctor timely if there is an abnormal value (before examination)                                                          | √        |
| 11. Evaluate the psychological status of patients and the mastery of cooperation methods before and during examination, and give targeted health education according to the evaluation results (before examination) | √        |
| 12. Re-emphasize the importance of fasting for 4 to 6 h before examination (before examination)                                                                                                                          | √        |
| 13. Evaluate the sleep and psychological status of the patients the night before examination, provide psychological consultation, guide the patients with methods to relieve anxiety and promote sleep, and use sleeping pills when necessary (before examination) | √        |
| 14. Evaluate the preparation of the examination, check the mastery of cooperation items in the examination, and relieve the mood of the patients (during examination)                                                              | √        |
| 15. Give real-time and targeted deep breathing instructive voice guidance according to the discomfort of the patient during examination (during examination)                                                                       | √        |
| 16. Pay attention to the psychological status of patients in the examination, give psychological support during the operation, and inform patients with positive information such as successful sampling (during examination) | √        |
| 17. Instruct the patients to rest in semi-sitting position for 30 min, and spray the pharynx and throat with silver ion spray, and demonstrate and guide the use of silver ion spray to patients and their families (after examination) | √        |
| 18. Diet guidance: after 2 h, eat warm or cool fluid as appropriate, and prevent aspiration (first drink 10 ml warm boiled water, and the patient is allowed to eat if no cough or other discomfort appears); avoid irritating food within 3 days after examination to reduce pharynx irritation (after examination) | √        |

(Continues)
Implementation of standardized health education pathway

Patients undergoing EBUS-TBNA were given education intervention according to the standardized health education pathway in order to keep the consistency of time, content and form of education.

1. In the appointment stage, the endoscopy doctors and nurses evaluated the basic situation, the attitude to the examination and the degree of knowledge of the patients, completed their education items in the pathway form, distributed the education sheet (including fasting time, medication requirements and preoperative examination) to the patients, and signed on the health education pathway form. The patient watched the respiratory exercise video and finished the appointment, and then the pathway form was brought back to the ward nurses.

2. Before the examination, the patient returning to the ward, gave some feedback to the ward nurses and doctors. They were urged to complete some items as exercise training and gastrointestinal tract preparation.

3. To confirm whether the patients could be examined in a normal psychological state, on the day of examination, the endoscopy nurse will evaluate the preparation and perfection of the patients. The patients recalled the coping methods of the discomfort during the examination. The endoscopy doctors informed the patients of the possible discomfort and coping methods in advance with attention to the transmission of positive information, in order to ensure that the patients could pass the examination smoothly.

4. After the examination, the endoscopy nurses advised the patients on diet, self-care and information concerning how to obtain the report, issued the corresponding education sheets, and completed the pathway.

Advantage of Standardized health education pathway

Based on a comprehensive literature review, expert group discussions in combination with the needs of patients, then the clinical trial was carried out and the initial instrument was revised. In terms of content, it is more comprehensive, complete and systematic. At the same time, health education executors were expanded including endoscopy room, ward nurses and ward attending, endoscopy doctors, while the feedback education model urged patients to really master education.

The head nurse of the research department and the endoscopy nurses regularly monitored the implementation of the pathway form, improved the work in time, and avoided the bias of the experiment.

Standardized health education pathway on Table 1.

2.3 | Study outcome measures

Self-rating anxiety scale (SAS)

Self-Rating Anxiety Scale (SAS) established by William W. K. Zung was used to evaluate the anxiety level of patients the severity of anxiety and its changes during treatment. The anxiety level of patients in the two groups was evaluated first at the time of appointment, which was regarded as the baseline of the psychological state of the patients. After the health education intervention, the second anxiety evaluation was carried out with the same scale before the implementation of the examination. The differences of anxiety level between the two groups under different intervention measures were compared.

The recovery time of heart rate and blood oxygen saturation of the patients

Stimulated by the insertion of tube for tracheostomy, patients would have symptoms such as choke, dyspnea, increased heart rate and decreased blood oxygen saturation. Under the guidance of medical staff and the self-adjustment of the patients, choke, and dyspnea got relieved, the heart rate slowed down, and the blood oxygen saturation increased to steady level. During the operation, the time between the increase of heart rate and the steady state was measured by the endoscopy nurses, and was counted as the recovery time of heart rate, while the time between the decrease of blood oxygen saturation and the steady state was recorded with the same method, and was counted as the recovery time of blood oxygen saturation.
Success rate of first intubation attempt
The endoscopy nurses observed and recorded the successful intubation of the patients, and recorded whether the intubation was successful at the first attempt. The success rate of first intubation attempt in the study (control) group was calculated as the case number of successful intubation patients at the first attempt/the number of patients in the study (control) group.

Patient satisfaction
The self-prepared patient satisfaction questionnaire was used to investigate patient satisfaction. The questionnaire contained totally 12 items, and was sent out to the patients by endoscopy nurses when they received the examination report after the examination. It was filled and given back to the nurses on the spot. Patient satisfaction was regarded as “unsatisfactory” if the patient was not satisfied with any one of the 12 items, while the evaluation of being “satisfied” and “basically satisfied” was considered “satisfactory.”

2.4 | Statistics methods
The data were statistically analyzed by SPSS20.0 software. Counting data were expressed by frequency and percentage, and the difference between the two groups was compared by χ² test. While the measurement data were described by mean ± SD, and the difference between the two groups was compared by two-tail t test. The difference was statistically significant when P < .05. Wilcoxon rank sum test was used if the sample data were not normally distributed.

3 | RESULTS
A total of 101 patients were enrolled in this study, including 51 cases in the study group and 50 in the control group. The average age was (58.23 ± 7.51) years and (58.19 ± 7.45) years, respectively; the majority of cases were male, which accounted for 66.67% and 64%, respectively; the educational backgrounds of most patients were primary
school, middle school and high school levels, which accounted for 80.39% and 82.0%, respectively; the majority of the patients were staff and farmers, who accounted for 64.71% and 68%, respectively; the main caregivers were spouses and children, who accounted for 88.24% and 84%, respectively; 94.12% and 96% of patients in the study group and the control group had medical insurance, respectively, with the main type of medical insurance for urban employees (residents); and the percentage of newly diagnosed patients was 58.82% and 56%, respectively.

The age was tested by independent t test, the gender, educational background, occupation, and being newly diagnosed or not were tested by χ² test, while the data of caregiver and medical insurance were tested by F test.

The psychological status of the patients in the two groups was evaluated using SAS scale, which was (45.10 ± 7.40) and (45.14 ± 8.21), respectively; the heart rate and blood oxygen saturation was (75.73 ± 6.81) beats/min and (98.37 ± 0.89)%, respectively, in the study group, and was (75.38 ± 7.39) beats/min and (98.18 ± 0.72)%, respectively, in the control group. Eleven patients in the study group (21.57%) and 13 patients in the control group (26%) had previous cardiopulmonary history.

The anxiety levels of patients in the two groups were compared using Wilcoxon rank sum test since they were not normally distributed. As shown in Table 3, SAS score of the study group was significantly lower than that of the control group (P < .001).

The heart rate and oxygen saturation recovery time of patients in the two groups were compared using Wilcoxon rank sum test since they were not normally distributed. As shown in Table 3, recovery time of heart rate and blood oxygen saturation in the study group were significantly lower than those in the control group (P < .001). The success rate of first intubation attempt between the two groups was tested by χ² test, and the difference of the success rate between the two groups was compared. As shown in Table 4, success rate of first intubation attempt in the study group was significantly higher than that in the control group (P = .007). The satisfaction of patients in the two groups was compared. As shown in Table 4, patient satisfaction of the study group was significantly higher than that of the control group (P = .013).

### TABLE 3
Comparison of Anxiety levels, time of the heart rate recovery, and time of blood oxygen saturation recovery of patients in the two groups (S)

|                          | Study group | Control group | Statistical value | P value |
|--------------------------|-------------|---------------|-------------------|---------|
| Case number              | 51          | 50            |                   |         |
| Anxiety levels           |             |               |                   |         |
| Median                   | 57          | 70            | Z = 6.9094        | < .001  |
| Inter-quartile range     | 50-62       | 67-78         |                   |         |
| Time of heart rate recovery (S) |         |               |                   |         |
| Median                   | 63          | 79            | Z = 6.9006        | < .001  |
| Inter-quartile range     | 58-71       | 74-84         |                   |         |
| Time of blood oxygen saturation recovery (S) |         |               |                   |         |
| Median                   | 48          | 66            | Z = 8.1745        | < .001  |
| Inter-quartile range     | 45-50       | 62-72         |                   |         |

### TABLE 4
Comparison of the success rate of first intubation attempt and patient satisfaction in the two groups

| Group         | Study group | Control group | χ² | P   |
|---------------|-------------|---------------|----|-----|
| First attempt |             |               |    |     |
| Succeeded     | 49 (96.08%) | 41 (82%)      | 7.36 | .007 |
| Failed        | 2 (3.92%)   | 9 (18%)       |    |     |
| Patient satisfaction |         |               |    |     |
| Satisfied     | 49 (96.08%) | 40 (80%)      | 6.23 | .013 |
| Unsatisfied   | 2 (3.92%)   | 10 (20%)      |    |     |

4 | DISCUSSIONS

As a new minimally invasive diagnosis and treatment technology of lung cancer, EBUS-TBNA plays a positive role in the early diagnosis of lung cancer. However, due to the irritation of the examination, patients often have negative feelings such as tension and anxiety, and cannot cooperate well with the examination, which even leads to the failure of the examination.

With the changing of medical model and the renewal of nursing model, health education plays an important role in performing its functions in hospitals. Some hospitals have invested a great deal of manpower, material resources and energy in health education. However, the current health education on EBUS-TBNA examinations is mostly a regular mission, with a single form, lack of theoretical guidance, no attributes of nursing pathways, and lack of specificity and sensitivity of health education evaluation indicators. In the present study, we apply to patients receiving EBUS-TBNA examination clinical nursing pathway, multiple media and feed-back education.
theory, which result in statistically significant difference. The SAS scores of the recovery time of heart rate and oxygen saturation in the study group were observably lower than those in the control group (P < .05, see Table 3), while the success rate of first intubation attempt and the satisfaction rate of the patients in the study group were remarkably higher (P < .05, see Table 4).

Consistent with the research of other scholars, Zhong found the experimental group had better outcome on anesthesia effect, intraoperative coordination, and higher success rate of one-time intubation (P < .005). During bronchoscopy, the endoscopic surface may cause tension and irritation to the throat and bronchial wall, which caused physical symptoms such as severe cough, suffocation, difficult breathing and fear, anxiety and blood pressure. This study studied the medical cooperation with standardized health education path for the patient education, supplemented by manual, video images, and mission. Patients in the intervention group could fully understand the significance of the examination, precautions, steps and key points of cooperation. In the intervention group, good cooperation with doctors’ examination significantly improved the success rate of intubation, anesthetic effect, psychological state, and personnel satisfaction.

Although the standardized health education pathway, combined the standardized management work with clinical health education, and the education of patients with a scientific, standardized, and clinically feasible health education model, can improve understanding and cooperation of patients in the examination, reduce the anxiety of the patients, reduce operation time, ensure safe and efficient operation of the examination, and promote the smooth examination of the patients. Limited by human and material resources, the standardized health education pathway was carried out in only one tertiary tumor hospital. In the future, researchers can further expand the sample size and further verify the conclusions of this study in more hospitals and wider areas.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

ETHICS STATEMENT
The study was approved by the Jiangsu Cancer Hospital Ethics Committee and the patient gave written informed consent.

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How to cite this article: Mao C, Cheng J, Xia H, et al. Effects of standardized health education pathway on patients undergoing endobronchial ultrasound-guided transbronchial needle aspiration. Precision Medical Sciences. 2021;10:71–77. https://doi.org/10.1002/prm2.12032