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The Impact of Bidirectional Quality Feedback Nursing Model on the Quality of Life and Self-Management Ability of Patients with Chronic Obstructive Pulmonary Disease (COPD)

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Abstract: *Objective*: To explore the intervention effect of the bidirectional quality feedback nursing model on the quality of life and self-management ability of patients with chronic obstructive pulmonary disease (COPD). *Methods*: A total of 60 COPD cases in the stable phase of the disease admitted to our hospital from January to December 2024 were included. Using a random number table method, they were divided into a control group and an observation group, with 30 cases in each group. The control group received the standard nursing protocol, while the observation group underwent a three-month bidirectional quality feedback nursing intervention in addition to the standard protocol. The quality of life and self-management ability scores of the two groups were compared before and after the intervention. *Results*: After the intervention, compared with the control group, the observation group showed lower scores in all dimensions of the St. George's Respiratory Questionnaire (SGRQ) and higher scores in all domains and the total score of the Self-Care of Chronic Illness Inventory-Modified for COPD (SCMMS) ($p < 0.05$). *Conclusion*: The bidirectional quality feedback nursing intervention can significantly improve the self-care level and quality of life of patients with COPD, demonstrating clinical application value.

Keywords: Bidirectional quality feedback nursing; Chronic obstructive pulmonary disease; Quality of life; Self-management ability

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1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a prevalent chronic airway disease worldwide, characterized by persistent airflow limitation as its primary pathological feature. The condition is prone to recurrent exacerbations and is difficult to cure, leading to severe impairment of pulmonary ventilation function, a significant decline

in quality of life, and increased family caregiving burden and socioeconomic healthcare costs [1]. Clinical studies indicate that standardized nursing interventions are crucial for delaying the progression of COPD and improving patient clinical outcomes [2]. Traditional routine nursing often adopts a unidirectional approach to implementing measures without adequately considering patients' individualized needs, resulting in insufficient targeted nursing interventions and difficulty in fully mobilizing patients' initiative in treatment participation. In contrast, bidirectional quality feedback nursing emphasizes interactive communication between nurses and patients, enabling real-time collection of patients' subjective experiences and feedback of nursing assessment information to achieve individualized adjustment and optimization of care plans [3]. Based on this, this study selected 60 patients with stable COPD and employed a grouped control design to explore the impact of this nursing model on patients' quality of life and self-management abilities. The details are presented below.

2. Materials and methods

2.1. General information

Sixty patients with COPD were included (selected from January 2024 to December 2024) and randomly divided into a control group and an observation group using a random number table method, with 30 patients in each group.

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

(1) Clinically diagnosed with COPD and in a stable phase (no acute exacerbations in the past 4 weeks) [4];
(2) Aged between 45 and 75 years;
(3) Mentally competent and able to cooperate in completing questionnaire assessments and nursing procedures;
(4) Patients and their legal representatives provided informed consent and voluntarily signed consent documents.

2.2.2. Exclusion criteria

(1) Patients with severe impairment of vital organ functions such as heart, liver, or kidneys;
(2) Patients with other types of respiratory system diseases;
(3) Patients with cognitive deficits or psychiatric disorders that prevent cooperation in the study;
(4) Patients who have received similar nursing interventions recently.

2.3. Methods

2.3.1. Control group

Routine nursing and post-discharge follow-up were implemented, including hospital admission education, medication guidance, demonstration of respiratory function training, and telephone follow-up after discharge, with an intervention period of 3 months. Specific measures included:

(1) Conducting health education activities on the day of admission and before discharge to systematically explain COPD-related knowledge, covering pathological mechanisms, treatment strategies, triggering factors, and preventive measures;

(2) Guiding patients to master the correct use of medications such as bronchodilators and corticosteroids and demonstrating the specific operational norms of inhalation devices in person;
(3) Advising patients to quit smoking, limit alcohol intake, maintain a balanced diet, and keep warm to prevent respiratory infections;
(4) Instructing patients on pulmonary rehabilitation training techniques such as pursed-lip breathing and diaphragmatic breathing;
(5) After discharge, using telephone follow-up to monitor patients' condition changes and promptly respond to related concerns.

2.3.2. Observation group

On the basis of the control group, a bidirectional quality feedback nursing model was implemented, with an intervention period of 3 months. A "nurse-patient-nurse" bidirectional feedback mechanism was established, with the following specific measures:

(1) Establishing a specialized nursing team

Comprising one attending physician from the respiratory department, three senior nurses, and one rehabilitation therapist. Team members received unified training to master the bidirectional feedback process and communication skills. The attending physician was responsible for formulating individualized treatment plans, the responsible nurse for implementing nursing interventions and collecting feedback, and the rehabilitation therapist for guiding respiratory rehabilitation training. All team members received training related to the bidirectional quality feedback nursing model and were proficient in feedback processes, communication skills, and assessment methods. Based on the existing care model, individualized care plans were developed according to patients' specific conditions, including medication guidance, respiratory training, dietary management, and psychological counseling. Face-to-face interventions were conducted once a week for 30-40 minutes each time, and an online communication group was established to facilitate patient consultations at any time.

(2) Establishing a bidirectional feedback mechanism

① Patient feedback to healthcare providers (input): Patients provided daily feedback on medication reactions, completion of respiratory training, and encountered difficulties (such as difficulty in expectorating sputum or medication side effects) through a "nurse-patient communication book", WeChat follow-up group, or telephone. ② Healthcare provider feedback to patients (output): The responsible nurse assessed patients' adherence, symptom control, and pulmonary function weekly and provided feedback on the assessment results to patients during follow-up visits or telephone calls, affirming positive behaviors and correcting negative ones.

(3) Optimizing nursing plans

The team held monthly meetings to make individualized adjustments to nursing plans based on bidirectional feedback information. For example, for patients with poor adherence to respiratory training, the reasons were analyzed as excessive training intensity or poor mastery of methods, and the training frequency was adjusted or one-on-one video guidance was provided.

2.4. Observation indicators

(1) Quality of life

Assessed before and after the intervention using the St. George's Respiratory Questionnaire (SGRQ), which includes three dimensions: symptoms, activity ability, and disease impact [5]. Each dimension has a score range of 0 to 100, with higher scores indicating poorer health-related quality of life in patients.

(2) Self-management ability

Assessed before and after the intervention using the Self-Management Ability Scale for COPD (SCMMS), which includes five dimensions: disease cognition, medication management, symptom monitoring, respiratory training, and emotion regulation, with a total of 25 items scored on a 1–4 scale [6]. The total score ranges from 25 to 100, with higher scores indicating better self-care abilities.

2.5. Statistical methods

Data comparison was performed using SPSS 26.0 software. Count data were expressed as percentages (%), and the chi-square (χ^2) test was used. Measurement data, which conformed to a normal distribution, were expressed as mean ± standard deviation ($\overline{x} \pm s$), and the *t*-test was used. A *p*-value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of general information

There was no significant difference in baseline data between the two groups ($p > 0.05$). See **Table 1**.

Table 1. Comparison of general information between the two groups [$\overline{x} \pm s$ / n (%)]

Group	Number of cases	Male/Female (cases)	Age (years)	Disease course (years)	Education level (Primary school and below/junior high school/high school and above)
Observation group	30	18/12	56.52 ± 5.56	3.43 ± 1.15	6/16/8
Control group	30	17/13	56.43 ± 5.44	3.35 ± 1.19	6/17/7
χ^2/t value	-	0.069	0.063	0.265	0.097
p value	-	0.793	0.950	0.792	0.953

3.2. Comparison of quality of life

After the intervention, compared with the control group, the observation group showed significantly lower scores in all dimensions of the St. George's Respiratory Questionnaire (SGRQ) ($p < 0.05$). See **Table 2**.

Table 2. Comparison of SGRQ scores between the two groups [$\overline{x} \pm s$, points]

Group	Number of cases (n)	Symptom dimension		Activity ability dimension		Disease impact dimension	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Observation group	30	67.52 ± 4.43	32.45 ± 3.16	65.22 ± 4.27	33.42 ± 3.11	66.67 ± 4.22	30.89 ± 3.16
Control group	30	67.38 ± 4.32	50.66 ± 3.21	65.28 ± 4.22	48.49 ± 3.14	66.56 ± 4.29	47.65 ± 3.13
t value	-	0.124	22.143	0.055	18.677	0.100	20.639
p value	-	0.902	0.001	0.957	0.001	0.921	0.001

3.3. Comparison of self-management ability

After the intervention, compared with the control group, the observation group demonstrated significantly higher scores in all dimensions and the total score of the Self-Care of Chronic Illness Inventory-Modified for COPD (SCMMS) ($p < 0.05$). See **Table 3**.

Table 3. Comparison of SCMMS scores between the two groups [$\overline{x} \pm s$, points]

Group	Number of cases (n)	Disease knowledge		Medication management		Symptom monitoring		Breathing exercises		Emotional regulation		Total score	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Observation group	30	10.45 ± 1.32	17.23 ± 1.17	10.21 ± 1.16	17.78 ± 1.32	10.88 ± 1.45	18.43 ± 1.10	11.76 ± 1.12	17.89 ± 1.21	9.23 ± 1.32	17.78 ± 1.23	50.78 ± 4.34	86.67± 4.34
Control group	30	10.37 ± 1.12	13.22 ± 1.13	10.11 ± 1.17	13.45 ± 1.33	10.67 ± 1.31	14.32 ± 1.12	11.56 ± 1.15	14.28 ± 1.24	9.45 ± 1.33	13.12 ± 1.36	50.56 ± 4.42	67.23 ± 3.23
t value	-	0.253	13.503	0.332	12.657	0.589	14.340	0.682	11.413	0.643	13.919	0.195	19.681
p value	-	0.801	0.001	0.741	0.001	0.558	0.001	0.498	0.001	0.523	0.001	0.846	0.001

4. Discussion

The key objectives of long-term management of Chronic Obstructive Pulmonary Disease (COPD) encompass not only alleviating patients' symptoms and slowing down the rate of lung function decline but also employing evidence-based nursing methods to foster patients' proactive awareness of self-monitoring their disease, thereby enhancing their long-term quality of life. In clinical practice, it can be observed that conventional care models often fail to track patients' subjective experiences in real-time, leading to discrepancies between intervention measures and patients' actual needs. This makes it challenging to transition from "passive nursing" to "proactive health management". In contrast, the core advantage of the bidirectional quality feedback nursing model lies in its ability to establish a closed-loop interactive mechanism that integrates patients' subjective experiences with nursing assessment results bidirectionally, paving the way for more innovative approaches to the long-term management of COPD [7].

The results of this study indicate a significant reduction in SGRQ scores in the observation group following the intervention. Analyzing the mechanism, traditional unilateral nursing models often overlook patients' subjective experiences, resulting in "nurse-patient information asymmetry". The bidirectional quality feedback model introduces the concept of closed-loop management, enabling precise delivery of nursing measures through real-time collection of patient feedback. For instance, when patients report worsening dyspnea, nurses can promptly intervene to assess and eliminate triggers or adjust rehabilitation plans, effectively alleviating symptoms and reducing disease-related restrictions on daily activities. This significantly enhances patients' subjective quality of life and minimizes disease interference in daily life [8]. Research by Wang Fang et al. also confirms that bidirectional feedback interventions contribute to improving lung function and quality of life in COPD patients, further supporting the application significance of this care model in enhancing patients' living standards [9]. Additionally, self-management ability is crucial for COPD patients to achieve long-term disease control. In this study, the significant improvement in SCMMS scores in the observation group aligns with Bandura's self-efficacy theory. The bidirectional feedback mechanism enhances patients' self-efficacy through a process of "behavioral feedback-positive reinforcement". Nurses regularly assess and provide feedback on patients' self-management behaviors, correcting erroneous health behaviors (such as improper oxygen inhalation and unplanned cessation of medication) and inspiring patients' intrinsic motivation through timely affirmation and encouragement. This transforms patients from

passive "compliance with medical advice" to proactive "self-managers" [10].

5. Conclusion

This study confirms that integrating bidirectional quality feedback mechanisms into COPD chronic disease management can effectively overcome the temporal and spatial limitations of traditional nursing. As clinical nursing managers, further studies should prioritize establishing normalized bidirectional communication channels (such as utilizing information platforms) and cultivating nurses' critical thinking and communication skills to achieve a transition from "disease nursing" to "health management".

Disclosure statement

The authors declare no conflict of interest.

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