

Developing a Model for Aesthetic Nursing Practice in Promoting Adherence to Pulmonary Rehabilitation Among Persons with COPD in China: A Technical Action Research

Abstract

Aim: This study aimed to develop a model of aesthetic nursing practice to promote adherence to pulmonary rehabilitation (PR) through technical action research (TAR).

Background: Patients with chronic obstructive pulmonary disease (COPD) often exhibit poor adherence to pulmonary rehabilitation. However, systematic, comprehensive programs that integrate aesthetic principles to promote adherence, tailored to the study site, are lacking.

Methods: We employed the philosophy of Pragmatism and the theory of Aesthetic Nursing Practice (AesNURP) to develop a nursing model to support adherence to PR in a respiratory care unit in China. AesNURP provided substantive knowledge to conduct the model development process through the aesthetics in nursing processes—encountering, co-creating caring relationships, and meaningful engaging, along with the phases of reconnaissance and TAR—planning, acting and observing, and reflecting. In addition, AesNURP was used to structure components and interventions for aesthetic nursing practice in the model. The model was developed through two iterative cycles of TAR.

Results: The developed model consisted of three processes of aesthetic nursing practice: (1) Connecting and Knowing, (2) Collaborative Planning, and (3) Coaching and Being With. These processes unfolded within an aesthetic environment characterized by both subjective emotional engagement and an objective sense of respect and harmony. The model was designed to support adherence to PR through a continuum of activities spanning inpatient care and home-based management.

Conclusion: This study developed and iteratively refined a nursing practice model tailored to the study site's specific clinical context. Further research is needed to examine implementation and longer-term sustainability across different clinical settings.

Keywords: Aesthetic nursing practice; COPD; pulmonary rehabilitation; technical action research

Introduction

Chronic obstructive pulmonary disease (COPD) is a heterogeneous group of lung diseases and ranks among the top three causes of death worldwide, according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) [1]. COPD imposes a substantial disease burden in China, including a high level of COPD-related mortality [2]. COPD management involves both pharmacological and non-pharmacological approaches to reduce symptoms, prevent exacerbations, and improve health status [3]. Pulmonary rehabilitation (PR) is an important non-pharmacological intervention that can improve dyspnea, exercise capacity, and health-related quality of life in persons with COPD [4].

PR is a comprehensive intervention based on patient assessment and individualized therapies, including exercise training, education, and behavior change, aimed at improving physical

and psychological health and promoting long-term adherence to health-enhancing behaviors [5]. PR can alleviate dyspnea, improve exercise tolerance, enhance quality of life, and reduce readmission rates and the risk of post-hospitalization mortality [6]. To gain these advantages, patients must actively engage in and commit to their rehabilitation program over the long haul. Recent clinical practice guidelines have provided detailed recommendations for the delivery of PR and strongly recommend participation in PR for adults with stable COPD [4].

Despite PR's well-established effectiveness, one study showed that long-term adherence after completing a PR program remains suboptimal [7]. Inadequate adherence to PR reduces its clinical effectiveness and remains a challenge in respiratory care. This highlights the importance of developing innovative nursing practice models that support sustained patient involvement in real-world medical settings.

A systematic review summarized factors affecting adherence to PR and proposed intervention recommendations. Achieving and sustaining adherence to PR is intricate and cannot be addressed with a single solution, such as education or encouragement [8]. Adherence is a dynamic process shaped by ongoing interactions among patients, family caregivers, healthcare professionals, and the healthcare environment throughout rehabilitation. However, evidence regarding effective strategies to support PR adherence remains limited [9].

An individual's educational level, PR difficulty, exercise habits, willingness to participate in PR [10], psychological factors, health literacy, interpersonal dynamics [8], emotional distress, perceived ineffectiveness, lack of support, self-awareness of functional decline [11], patients' and families' lack of knowledge, lack of patient-centeredness, lack of coordination in the PR team, inadequate professional competence of PR staff, lack of a holistic approach to PR, ineffective PR planning, and discontinuity of care [12], healthcare-system factors and collaboration among healthcare providers may also influence PR uptake and participation [13]. Therefore, poor patient adherence to PR is a complex nursing practice issue that requires coordinated, context-specific, patient-centered strategies. Because these factors develop throughout the rehabilitation journey, strategies to support adherence require ongoing adaptation, stakeholder collaboration, and continuous refinement in routine nursing practice.

A systematic review identified strategies such as patient education, behavior change, digital and peer support, and improved access to services [9]. Another review highlighted the importance of customizing interventions to patients' unique needs and clinical situations [8]. However, current research focuses primarily on intervention effectiveness, with little attention to how researchers develop and adapt such interventions and models to clinical contexts. Furthermore, active involvement of patients, family caregivers, and frontline healthcare professionals in healthcare development processes remains important, as action research (AR) can enable stakeholders to contribute directly to the development of person-centered care [14]. One randomized controlled trial (RCT) used an experience-based co-design approach to develop a patient education video for post hospitalization PR; however, the intervention did not significantly improve PR uptake, referral, or completion [15]. Evidence describing the collaborative development and iterative refinement of a theory-informed nursing practice model remains limited.

To address these limitations, this study adopted an integrated research approach guided by pragmatism, Technical Action Research (TAR), and Aesthetic Nursing Practice (AesNURP) Theory. Pragmatism served as the philosophical foundation by emphasizing practical problem-solving,

experiential learning, and generating knowledge through real-world practice [16]. Consistent with this stance, researchers selected TAR because it enables them to collaboratively identify clinical problems, implement context-specific solutions [17], and continuously refine nursing practice through iterative cycles of action and reflection [18]. Building on this methodological approach, AesNURP provided the nursing theoretical foundation for model development. As a middle-range nursing theory, AesNURP emphasizes caring for persons as whole human beings through the interconnected processes of encountering, co-creating caring relationships, and meaningful engaging within an ethical nursing environment [19]. Rather than serving only as the conceptual basis for designing the model, AesNURP was embedded throughout the action research process to guide stakeholder engagement, model refinement, and the translation of person-centered nursing care into routine PR practice.

This paper provides a detailed account of the project development phase of an AR study entitled “Developing a Model for Aesthetic Nursing Practice to Enhance Adherence to Pulmonary Rehabilitation Among Persons with COPD”. This study aimed to develop a site-specific model to support adherence to PR by integrating pragmatism, TAR, and AesNURP Theory. This study demonstrates a theory-informed and context-sensitive approach to translating nursing knowledge into routine clinical practice. The resulting model provides a practical framework for supporting PR adherence while offering methodological guidance for developing and refining nursing practice models in other complex clinical contexts.

Philosophical and Theoretical Framework

This study aimed to develop and refine a model for AesNURP to support adherence to PR among persons with COPD after acute exacerbation. Pragmatism guided the researcher's perspective toward the use of research methodology and a new model in this study to achieve practical outcomes [16]. TAR provided the methodological framework for developing and refining the model through reconnaissance, followed by two iterative cycles of planning, acting, observing, and reflecting, enabling the researcher to integrate theoretical knowledge with participants' experiences and feedback from clinical practice [18]. AesNURP theory provided substantive knowledge for the researcher to conduct the model development process through aesthetic practices in nursing [19], along with the AR phases. In addition, the researcher used AesNURP to structure the model's components and interventions for nursing practice. The TAR methodology guided the entire research process.

Pragmatism: Pragmatism emphasizes the practical consequences of ideas and the role of experience in developing knowledge [16]. This philosophical perspective was consistent with the study's focus on developing and refining a nursing practice model in response to practical clinical needs. Through real-world application and reflection, the model was iteratively refined to better fit the clinical context.

Technical Action Research: In a 1946 publication, Lewin systematically introduced the concept of AR, a method that emphasizes the close integration of social science research with the practice of social change. Through a spiral cycle of action and research in real-life contexts, this approach aims to solve practical problems and generate new knowledge [20]. As research has evolved, scholars have classified AR into different types, each addressing specific research questions arising from particular settings and involving different individuals, communities, or organizations. AR uses

a spiral research process with core iterative steps: planning, acting, observing, and reflecting. Additionally, a crucial step precedes the spiral cycle: the reconnaissance phase, which establishes a group of participants, clarifies current practices, identifies problems, and raises awareness [18]. TAR is an artifact-driven action research approach designed to bridge the gap between ideal research designs and real-world contexts. Researchers assume the roles of artifact developers, investigators, and facilitators. Participants engage in AR, implement the research plan, and share their opinions and experiences; however, they do not lead research decision-making, research plan development, or theory formulation [17]. TAR has been applied in real-world research settings [21]. In summary, TAR provides a comprehensive framework for developing and applying models within real-world settings. Before our study, we concluded, based on a literature review and site analysis, that persons with COPD have low adherence to PR. In this study, the researchers understood the research setting and the knowledge gap in this field. TAR therefore guided the development, implementation, reflection, and iterative refinement of the tentative model in the clinical setting.

Theoretical Underpinnings: Kongsuwan [19] developed the AesNURP theory based on the unitary-transformative paradigm, proposing the integration of nursing cognition, care theory, and the concept of co-creation. This theory posits five hypotheses: 1) Persons are caring by virtue of their humanness: Nurses recognize and express themselves in the nursing process, and acknowledge that those in their care are also independent individuals with an inherent capacity for care. 2) The ideal of wholeness is a perspective of oneness: This reflects the concrete wholeness and constantly dynamic nature of the human person. 3) Persons co-create aesthetic expressions in nursing: In the nursing context, the caregiver and the care recipient jointly construct aesthetic expression and co-create an aesthetic care experience. 4) Persons mutually interact with the environment: People and their environment influence one another. 5) Aesthetics in nursing is within an aesthetic nursing environment: The aesthetic quality, humanistic care, and aesthetic nursing practice do not arise out of thin air; they can only be realized within a warm, comfortable, and respectful aesthetic nursing environment.

AesNURP consists of three main processes: First, encountering. This process mainly answers two questions: who is being cared for, and what are the person's wishes and dreams. An encounter occurs when the nurse and the person being cared for know each other as caring people. Based on various patterns of nursing knowing, this theory identifies five types of knowing patterns, thereby explaining how nurses can better understand and perceive patients: 1) Aesthetic knowing; 2) Personal knowing; 3) Empirical knowing; 4) Ethical knowing; 5) Technological knowing. Second, Co-Creating a Caring Relationship: To improve the quality of care and achieve synchronized care, nurses need to participate in and co-create this caring process with the cared-for person, which requires mutual tolerance, understanding, support, and trust. Third, Meaningful Engaging: Good nursing activity arises from mutual participation in nursing practice, in which the nurse and the cared-for express care through aesthetic nursing practice, using forms of art such as poetry, painting, and sculpture to express each other's ideas. These practices take place within an aesthetic environment that encompasses both objective and subjective dimensions. The PR program at the study site lacks a holistic approach, collaborative creativity between nurses and patients, and aesthetic elements. Therefore, this study employed AesNURP to construct the PR model.

This study used AesNURP theory in two ways:

AesNURP theory-based research processes in action research (Table 1).

AesNURP theory-based nursing practice in the model (Table 2).

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Table 1. AesNURP Theory-based Research Processes in Action Research

Phases of Action Research [18]	Practice Processes of Aesthetics in Nursing (<i>PraPan</i>) [19]	Research Activities in the Study
Reconnaissance This phase focused on understanding the context and identifying the needs for developing a nursing model.	Encountering The phase involved exploring and engaging with participants to understand their experiences and expectations.	Gathered baseline data by interviewing participants to identify existing challenges and recommendations in current nursing practices. Built trust and established a clear understanding of the aesthetic nursing environment.
Planning This phase was dedicated to designing and refining the structure and components of the nursing model.	Co-creating caring relationships The process ensured that nurses and the research team collaboratively revised the model to ensure that it met clinical practice requirements.	Defined the model's core components, principles, and goals, ensuring alignment with aesthetic nursing theory and the nursing practice situation.
Acting and Observing: This phase focused on implementing and refining the proposed nursing practice model in the setting.	Meaningful engagement: The phase applied the nursing model in real clinical contexts to ensure its relevance, practicality, and meaningful participation of patients, family caregivers, and nurses.	The nursing model was implemented in selected settings to explore its applicability, practicality, and responsiveness to participants' needs. The research team supported the implementation process by preparing relevant materials and collaboratively addressing challenges encountered during practice.
Reflecting This phase emphasized reflecting on the action process, reviewing implementation experiences, and identifying areas requiring modification.	Meaningful engagement Meaningful engagement encouraged nurses, patients, and caregivers to actively participate in reflective discussions regarding the model's feasibility, relevance, and areas for improvement.	Evaluated the model's strengths and limitations, reviewed implementation experiences and participant feedback, revised the model as needed, and documented lessons learned to guide further development.

Table 2. AesNURP Theory-based Nursing Practice in the Model

Substantive Knowledge in AesNURP Theory [19]	Translation of AesNURP to Nursing Practice in the Model
Five Assumptions	

Substantive Knowledge in AesNURP Theory [19]	Translation of AesNURP to Nursing Practice in the Model
1. Persons are caring by virtue of their humanness.	Recognizes both patients and caregivers as inherently caring individuals. This forms the foundation of trust and empathy in nurse-patient interactions, critical for fostering adherence to PR programs.
2. Ideal of wholeness as a perspective of oneness.	Treats patients as holistic beings by addressing their physical, emotional, and psychological needs. This reflects a holistic approach to PR that considers physical, emotional, and psychological needs.
3. Persons co-create aesthetic experiences.	Actively involves patients in designing and personalizing their PR journey. Encourages them to express their goals, preferences, and feedback, and supports the development of interventions that are meaningful and responsive to individual needs.
4. Persons mutually interact with the environment.	Nurses create an environment conducive to healing and care. This includes reducing barriers such as anxiety-inducing settings and optimizing the physical space to promote engagement in PR activities.
5. Aesthetics in nursing is within an aesthetic environment.	Nurses design visually and emotionally pleasant rehabilitation spaces to create comfort and security. Nurses create supportive, warm environments based on patients' actual conditions and clinical nursing needs in both hospital and home settings.
Three Practice Processes of Aesthetics in Nursing	
1. Encountering	Nurses initiate meaningful interactions and listen to patients' and family caregivers' experiences and wishes. This involves understanding their struggles with breathlessness, fear, and challenges with adherence.
2. Co-creating caring relationships	Nurses build a relationship with patients by including them in the care planning process. This enables individual needs and personal rehabilitation goals to be incorporated into PR planning.
3. Meaningful engagement	Nurses encourage patients to participate actively in their care by integrating motivational strategies and aesthetic experiences into PR. For example, nurses use guided imagery or mindfulness to enhance engagement in breathing exercises.
Aesthetic Environment	

Substantive Knowledge in AesNURP Theory [19]	Translation of AesNURP to Nursing Practice in the Model
1. Subjective domain	Incorporates patients' internal experiences, emotions, and values into the care process. For instance, nurses understand how patients feel about their PR journey and adapt interventions accordingly.
2. Objective domain	Creates physically comfortable and visually appealing PR settings, including calming colors, adequate lighting, and a spacious arrangement to support movement and relaxation.

Methods

Setting and Study Design: The PR program in the study setting focused primarily on exercise training and lacked several important components, including psychological support, health education, and follow-up support. PR practices were fragmented and lacked a systematic, comprehensive model or theoretical foundation. These practices were not tailored to individual needs, and motivation to participate in and sustain PR was limited among healthcare professionals and patients.

This study developed an aesthetic nursing practice model to promote adherence to PR among persons with COPD. The process included the following stages: During the reconnaissance phase, this study used the Medical Subject Headings (MeSH) terms “COPD”, “pulmonary rehabilitation”, and “adherence” as retrieval terms. The study systematically searched relevant literature, conducted a literature review to analyze and synthesize factors influencing PR adherence among persons with COPD, and developed a tentative model based on the AesNURP theory. Additionally, the study collected qualitative descriptive data through face-to-face individual interviews to gather participants’ (nurses, patients, family caregivers) experiences with PR and their recommendations. In the planning phase, participants’ feedback and the real situation informed revisions to the tentative model. During the reflection phase of Cycle 1, participants discussed implementation experiences and proposed modifications to refine the model. The revised model was subsequently implemented during Cycle 2. As no additional modifications were proposed during the final reflection of Cycle 2, no further revision was made, and the model was finalized.

Recruitment and Sample: During the reconnaissance phase, this study used purposive sampling to recruit participants, employing the following specific measures: 1) describing the study’s objectives and content during the nurses’ morning handover meetings; 2) having the head nurse and research assistants explain the study’s content within the unit; and 3) posting recruitment notices in prominent locations within the unit. These measures were used to recruit participants who voluntarily agreed to participate in the study.

Inclusion criteria to recruit the nurse participants were: 1) a registered nurse with more than five years’ experience in a general respiratory unit, to ensure participants had sufficient clinical experience to reflect on current PR practice, and 2) documented attendance at PR training or relevant certification, ensuring both deep clinical insight into COPD care and the specialized expertise needed to provide rich, informed interview data.

The inclusion criteria for patients were: 1) diagnosed with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) by a physician at admission; 2) clinically stable with a post-bronchodilator $FEV_1 \geq 50\%$ of the predicted value; 3) participation in a PR program within the past year or self-directed PR experience; 4) aged ≥ 18 years, able to communicate in Mandarin, and able to use WeChat; and 5) residing in Guiyang City.

The exclusion criteria for patients were: 1) having the following diseases combined at the time of admission: pneumothorax, acute pulmonary embolism, acute aortic aneurysm and coarctation, acute ischemic heart disease, malignant tumors, and acute stroke. The researcher reviewed medical records and physician diagnoses in the healthcare system to determine whether patients had any of these comorbidities.

The inclusion criteria for family caregivers were: 1) be a patient’s family member who has provided care as the primary caregiver for the patient with COPD for more than six

months, 2) be older than 18 years and be able to record simple text or pictures, and 3) be able to consistently fulfill the role of caregiver during the study period.

The exclusion criteria for family caregivers were: 1) those with severe chronic diseases such as hypertension, diabetes mellitus, heart disease, and kidney disease.

For the TAR phase, we invited all nurses working in this unit to participate in the AR process. In total, the reconnaissance phase included 12 nurses, 12 patients, and 11 family caregivers. All 41 nurses working in the unit participated in both action research cycles, including planning, implementation, and reflection activities. The 12 nurses interviewed during reconnaissance were a subset of these 41 nurses. No participants dropped out or withdrew during the study.

Ethical Considerations: This research received approval from the Institutional Review Board of the Center for Social and Behavioral Sciences, Prince of Songkla University (ref. 2025-St-Nur-022 [Internal]), as well as from the Medical Ethics Committee of the Affiliated Hospital of Guizhou Medical University (ref. 2025116k). We obtained written informed consent from all participants before their involvement. The study design and conduct strictly adhered to research ethics principles, fully respecting participants' rights to informed consent, voluntary participation, and privacy protection. Prior to the start of the study, participants were provided with a detailed explanation of the study's objectives, procedures, safety, intended use of data, and their right to withdraw. Throughout the study, we adhered to the four core ethical principles of voluntariness, non-maleficence, confidentiality, and fairness. We anonymized all collected questionnaires and clinically relevant data to prevent disclosure of personal information. All research materials and raw data were stored on a computer secured with dual passwords set by the researchers. Individuals outside the research team (such as members of the ethics committee or journal editorial board) will be granted access only after submitting a written request and providing a reasonable justification. Data will be retained for at least five years, in accordance with ethical guidelines, and will be used solely for analysis within this academic study; it will not be utilized for any commercial or non-research purposes. The study safeguarded participants' rights and interests throughout the process, and strictly upheld academic integrity and research ethics.

Developing the Model Process: This study formed the core of the first author's doctoral dissertation and took approximately two years to complete, from the literature review to the final development of the model. Prior to the project, she had gained over two years of practical experience at the study site, so she was already quite familiar with the PR program and the nursing staff there.

In the first phase of the study, the first author reviewed and analyzed the literature in this field and held multiple meetings with the head nurse and clinical nurses at the study site to gain an understanding of actual clinical conditions. Under the guidance of the second author, an initial model was constructed based on the AesNURP theory and literature review, and revisions were made following feedback from the proposal defense panel.

Following ethical approval, the study commenced with a two-month (early August to early October 2025) reconnaissance phase (encountering) to understand the existing PR practice and identify factors influencing adherence within the study setting. Guided by Aesthetic Nursing Practice Theory (AesNURP), the researcher first conducted a literature

review to develop a tentative nursing practice model. Subsequently, semi-structured individual interviews were undertaken with 12 nurses, 12 persons with COPD, and 11 family caregivers to explore their experiences, perceived challenges, and recommendations regarding PR adherence. The 12 nurses interviewed during the reconnaissance phase were a subset of the 41 nurses who subsequently participated in the TAR cycles. Routine clinical practice was also observed, and reflective field notes were maintained throughout the process. Findings from the literature review, stakeholder interviews, and clinical observations were synthesized to refine the tentative model and inform the subsequent planning phase.

The revised model was subsequently refined through two iterative cycles of TAR conducted from early October 2025 to the end of March 2026. Each cycle comprised planning, acting, observing, and reflecting.

Cycle 1: Planning. Cycle 1 was conducted from early October 2025 to early January 2026. During the planning phase, the tentative model was reviewed and discussed in a group meeting involving the 41 participating nurses, the head nurse, one research assistant, one PR specialist nurse, and the researcher (45 participants in total). The discussion focused on the feasibility of implementing the tentative model in routine clinical practice and the modifications needed before implementation.

Cycle 1: Acting and Observing. During the acting and observing phase, all 41 nurses participated in implementing the tentative model in routine nursing practice. The model was implemented through three interconnected processes derived from AesNURP: Connecting and Knowing (Encountering), Collaborative Planning (Co-Creating Caring Relationships), and Coaching and Being With (Meaningful Engaging).

Connecting and Knowing was initiated during Days 1–2 after the patient's condition had stabilized and focused on establishing a caring and trusting relationship and understanding the patient's physical condition, PR readiness, needs, goals, values, strengths, challenges, and family context. Collaborative Planning was primarily undertaken during Days 3–4 and involved nurses, persons with COPD, and family caregivers in developing individualized PR goals and plans. Coaching and Being With extended from the later period of hospitalization through discharge preparation and home-based follow-up and focused on supporting PR implementation, providing education and feedback, addressing difficulties and barriers, involving family caregivers, and supporting continuation of PR after discharge.

The nurses served as the primary implementers of the model, while the researcher acted as a facilitator by providing implementation support, observing clinical practice, documenting implementation experiences, and maintaining reflective field notes. The researcher visited the study site every day during implementation to provide support when needed. The researcher documented implementation experiences and practical issues through observational records, reflective field notes, meeting records, and relevant implementation documents.

Cycle 1: Reflecting. The formal reflection for Cycle 1 was conducted during the regular nursing meeting on the last Thursday of December 2025. The group discussion lasted approximately 2 hours and involved all 45 participants who had participated in the planning meeting. Participants reflected on their experiences of implementing the tentative model, discussed problems encountered during implementation, and proposed modifications for

the next cycle. Meeting records were maintained to document the issues discussed, participants' recommendations, and proposed modifications to the model.

Data from the group discussion were reviewed together with observational records, reflective field notes, meeting records, and implementation documents to identify implementation problems, participants' recommendations, and components of the model requiring modification. Findings from this reflection informed revision of the model before implementation in Cycle 2.

Cycle 2: Planning. Cycle 2 was conducted from early January to the end of March 2026. Planning for Cycle 2 was based on the findings from the Cycle 1 reflection. The research team reviewed the implementation problems and recommendations identified during Cycle 1 and revised the model before the second cycle began. The three core processes—Connecting and Knowing, Collaborative Planning, and Coaching and Being With—were retained, while specific implementation strategies were modified to improve their feasibility within routine clinical practice.

Cycle 2: Acting and Observing. All 41 nurses participated in implementing the revised model during Cycle 2. The three core processes and their sequence were retained, while the revised implementation strategies identified through the Cycle 1 reflection were incorporated into routine nursing practice. As in Cycle 1, the nurses served as the primary implementers, while the researcher facilitated implementation, observed clinical practice, documented implementation experiences, and maintained reflective field notes.

The implementation process was monitored through observational records, reflective field notes, meeting records, and relevant implementation documents. Regular group meetings continued to be held on the last Thursday of each month, lasting approximately 1–2 hours, to discuss implementation experiences, practical difficulties, and whether further modifications to the model were required.

Cycle 2: Reflecting. At the end of Cycle 2 in late March 2026, a final group reflection was conducted to review participants' experiences with the revised model and determine whether further modification was required. The final group reflection was documented through meeting records, which captured participants' implementation experiences, recommendations, and whether further modification of the model was considered necessary. These records were reviewed together with observational records, reflective field notes, and implementation documents.

During the final reflection, the participating nurses did not propose additional modifications to the model. Therefore, no further revision was made, no third TAR cycle was undertaken, and the model developed through the two TAR cycles was finalized.

After the study concluded, the first author remained in contact with the nurses at the study site and continued to provide them with informational support regarding their nursing practices. Under the head nurse's leadership, they also continued to hold monthly meetings. This aligns with the researchers' original motivation for choosing the TAR approach: they hoped that this nursing model would continue to be applied and refined within the department, as the environment is constantly changing.

Data Analysis:

Data analysis was supported by NVivo software [22], which was used to facilitate data organization, management, and coding. NVivo was used as a data-management tool

rather than to generate or interpret the findings; interpretation and thematic development were undertaken by the researchers. Interview transcripts and textual data derived from participants' aesthetic expressions were analyzed using Kongsuwan's approach to thematic analysis [23].

For textual data, the analysis involved four steps: (1) reading and re-reading each participant's transcript or text to obtain an overall understanding of the participant's experience; (2) identifying key words, phrases, sentences, and statements that represented significant aspects of the experience; (3) reviewing and comparing the identified meanings and thematic statements and retaining those relevant to the phenomenon under study; and (4) grouping thematic statements with similar meanings into thematic categories. Participants' drawings were analyzed together with their verbal explanations rather than being interpreted independently by the researchers. The analysis involved: (1) observing the overall appearance of each drawing, including its form, colors, and written text; (2) exploring and reflecting on the meaning of the drawing through dialogue with the participant; (3) interpreting its overall meaning in relation to the participant's explanation and corresponding interview content; (4) returning to the interview transcript to identify and highlight significant statements and themes; and (5) examining the relationship between the identified themes and the drawing and categorizing the drawing under the corresponding theme.

During the reconnaissance phase, individual interview data from nurses, persons with COPD, and family caregivers, together with participants' aesthetic expressions and observational field notes, were analyzed to identify experiences, barriers, needs, and recommendations related to PR adherence and existing nursing practice. These findings were considered alongside evidence from the literature to identify gaps between the tentative model and the clinical context and to inform the planning of Cycle 1.

During Cycles 1 and 2, data generated through the action research process were analyzed iteratively to inform model refinement. The team reviewed meeting records from group discussions alongside observational records, reflective field notes, and implementation documents to identify implementation experiences, practical problems, participant recommendations, and model components requiring modification. The analysis focused on linking evidence arising from implementation and reflection to the corresponding decisions and modifications made to the model. Findings from the Cycle 1 reflection informed revision of the model before Cycle 2. Following implementation of the revised model in Cycle 2, the same analytic process was applied to the final reflection data. As no additional modifications were proposed by the participating nurses, no further revision of the model was made.

Trustworthiness and Rigor:

Lincoln and Guba's four criteria of trustworthiness were adopted in this study [24]. To improve credibility, methodological triangulation was used by drawing on multiple data sources, including individual interviews, participants' aesthetic expressions, clinical observations, group discussions, and reflective field notes. Member checking was conducted by sending the analyzed results back to participants for verification. Researcher reflexivity was maintained through ongoing self-reflection and reflective field notes. The accuracy of the reconnaissance interview data was supported through repeated review of the interview

transcripts and verbatim transcription of the individual interviews. For the TAR cycles, group discussions were documented through meeting records, which were considered together with observational records, reflective field notes, and implementation documents during model refinement. Confirmability was supported by systematic data management in NVivo, documentation of coding and analytic decisions, and maintenance of an audit trail linking the original data, interpretations, and model-development decisions. Regular peer review and debriefing with members of the research team were also undertaken during data collection and analysis. Dependability was supported by fully documenting all research procedures, with all records cross-checked and all findings reviewed and agreed upon by the supervisory team. Transferability was supported through thick description of the participants, clinical context, and model-development process, enabling readers to judge the applicability of the findings to other contexts.

Findings

Participant Characteristics

During the reconnaissance phase, 12 nurses, 12 persons with COPD, and 11 family caregivers participated in individual interviews. Their characteristics are summarized in Table 3. A total of 41 nurses participated in both TAR cycles, including the 12 nurses who participated in the reconnaissance interviews. Characteristics of the nurses participating in the TAR cycles are presented in Table 4.

Table 3. Characteristics of Participants in the Reconnaissance Phase

Characteristic	Nurses (n = 12)	Persons with COPD (n = 12)	Family caregivers (n = 11)
Age, years	33.3 (28–40)	66.1 (51–82)	55.4 (36–72)
Sex, n (%)	Female: 12 (100)	Male: 12 (100)	Female: 9 (81.8); Male: 2 (18.2)
Education, n (%)	Below bachelor's: 1 (8.3); Bachelor's: 10 (83.3); Master's: 1 (8.3)	Primary school: 3 (25.0); Middle school: 8 (66.7); Junior college: 1 (8.3)	Below bachelor's: 8 (72.7); Bachelor's: 3 (27.3)
Relevant experience/duration	Nursing experience: 10.0 years (5–17)	COPD duration: 11.7 years (3–25); PR participation: 2.6 years (1–5)	
Relationship to person with COPD, n (%)			Partner: 4 (36.4); Daughter: 5 (45.5); Son: 2 (18.2)

Note. Age and duration variables are presented as mean (range); categorical variables are presented as n (%). PR = pulmonary rehabilitation; COPD = chronic obstructive pulmonary disease.

Table 4. Characteristics of Nurses Participating in the TAR Cycles (N = 41)

Characteristic	Value
Sex, n (%)	Female: 39 (95.1); Male: 2 (4.9)
Age, years, n (%)	18–25: 2 (4.9); 26–30: 7 (17.1); 31–40: 24 (58.5); 41–50: 5 (12.2); 51–60: 3 (7.3)
Education, n (%)	College diploma: 6 (14.6); Bachelor's degree: 34 (82.9); Master's degree: 1 (2.4)
Working experience, years, mean (SD)	10.76 (6.00)

Note. SD = standard deviation. Twelve of the 41 nurses also participated in the reconnaissance interviews.

Factors Affecting Adherence in PR

A literature review identified several factors that influence patients' adherence to PR. Those factors were mainly divided into five categories: 1) Individual Characteristics: Factors such as gender, educational level, severity of dyspnea, lung function, comorbidities, physical limitations, and fatigue form the foundational context for adherence [10]. To a certain extent, these factors may influence patients' ability to participate in PR. 2) Psychological and Cognitive Factors: Emotional distress and anxiety [8], motivation to undergo PR, insufficient understanding of the program, limited comprehension of its potential benefits [11], and feelings of frustration during the rehabilitation process [12] all may influence patients' motivation to continue participating. 3) Behavioral and Lifestyle Factors: Previous exercise habits and prior participation in systematic PR programs [13], mental resilience, and religious beliefs [11], and persistent smoking [8] may influence patients' participation in and adherence to PR. 4) Intervention-related Factors: The more complex and difficult the rehabilitation plan, the more likely patients were to resist or discontinue it; conversely, simple, individualized plans that were integrated into daily life may be more conducive to long-term adherence [12]. 5) System and Contextual Factors: These include issues such as the competence of professionals [8] and their attitude [25], access to medical resources, the capacity of PR services, collaboration among healthcare teams, family involvement [8, 12], transportation, scheduling, financial burden, health insurance coverage, environmental limitations, and poor exercise conditions [11], healthcare professionals' professional competence and attitudes towards pulmonary rehabilitation [26]. All of these factors pose practical barriers to patient participation in PR. Therefore,

promoting adherence to PR is a complex process shaped by individual, behavioral, intervention, and systemic factors.

Model Content Under the Theory

Using the influencing factors identified through a literature review as the core basis for model development, the program encompasses all measures from the time a patient's condition stabilizes through post-discharge follow-up, ultimately aiming to promote adherence to PR. The details are as follows:

Encountering. This process occurs during Days 1–2 after admission, once the patient's condition has stabilized. This involves initial interactions among nurses, patients, and their families to establish an equal, cooperative, trusting relationship and optimize the basic aesthetic environment, reducing patients' unfamiliarity with the hospital environment and nursing staff. A comprehensive patient assessment is required to analyze individual characteristics and lay the groundwork for subsequent interventions.

Aesthetic knowing: Use the aesthetic method to understand patients' current feelings and experiences regarding PR, and analyze the underlying meaning behind these expressions. For example, encourage patients to express the challenges they encounter during the PR process through speaking, drawing, or storytelling. Nurses can gather information by observing patients' facial expressions and body language, as well as by listening to their words. By analyzing this information, they can identify the factors (such as anxiety, frustration, and other emotions) affecting PR adherence.

Personal knowing: Nurses develop a clear understanding of their role, responsibilities, and capabilities in PR care. They also need a deep understanding of each patient's unique characteristics (personality, habits, lifestyle, and motivation for PR). Through intuitive insight, they identify the preparations and needs required to support adherence to the PR program for themselves, their patients, and family caregivers.

Empirical knowing: Nurses obtain objective data on patients' clinical symptoms through methods such as reviewing medical records, conducting physical examinations, and administering tests. By integrating scientific knowledge and relying on evidence-based practices, they develop rehabilitation plans that specifically address physiological impairments—such as pulmonary function, comorbidities, and physical limitations—associated with individual characteristics, thereby providing a scientific foundation for the PR program.

Ethical knowing: The key is to clarify the core values shared by both caregivers and patients, respect their autonomy, integrate the patient's habits and preferences into the PR plan, ensure the plan does not exceed the patient's actual capabilities, and balance rehabilitation needs with the patient's actual circumstances.

Technological knowing: Nurses need to assess their own ability to use PR-related equipment and interpret device data to determine the patient's actual health status. They should also evaluate the patient's and family's understanding of rehabilitation exercises, identify the equipment available in the patient's environment, assess the patient's access to medical resources and the level of family support, and identify any environmental barriers. This prepares the groundwork for designing a systematic PR program.

Co-Creating Caring Relationship. This process occurs during Days 3–4 after the patient's condition has stabilized. At this stage, nurses introduce the tentative PR plan to the

patients and their family members. Nurses, patients, and family members need to work together to design and give suggestions for personalized PR plans, address key barriers related to interventions, behavioral and lifestyle factors, and individual characteristics, shift patients and family caregivers from passive recipients to active participants, help patients master rehabilitation skills, strengthen their motivation for rehabilitation, and simultaneously enhance the creation of an aesthetically pleasing environment.

For example, nurses design a PR plan tailored to the patient's specific circumstances based on comprehensive assessment data obtained during the Encountering phase. Patients with varying disease severity receive different rehabilitation approaches, with those in more severe condition focusing primarily on breathing exercises. Nurses integrate breathing exercises into daily life according to the patient's preferences; for instance, pursed-lip breathing can be incorporated while taking a walk. The PR plan is individualized, patient-centered, and integrated into daily life. Nurses also encourage support from family members and peers.

Meaningful Engaging. This process extends from the later stage of hospitalization through discharge and long-term home follow-up. The objective of this phase is to guide patients to actively adhere to their rehabilitation plan, continuously address obstacles encountered during PR, reinforce rehabilitation habits, and ensure long-term commitment to PR. Throughout this process, aesthetic and humanistic care supports the model's ultimate goal.

For example, nurses encourage patients to express their feelings and rehabilitation progress through journaling, drawing, or verbal accounts, and provide targeted feedback and praise. Patients document obstacles encountered during PR and provide feedback to nurses, who then offer tailored solutions. Nurses closely monitor patients' rehabilitation progress, respect their individual pace, and encourage them to persist with the program. During hospitalization, the physical environment is continuously optimized to maintain a warm and supportive psychological atmosphere. After discharge, nurses guide family members to optimize the home environment, strengthen long-term family support through WeChat groups and phone calls, and foster a positive psychological atmosphere for home-based rehabilitation, extending the aesthetic environment from the hospital to the home.

Model Changes Following Planning

Model Refinement During Cycle 1 Planning: Based on the results of the reconnaissance phase, the research team held a group discussion with all nurses in the unit. The researchers presented the findings from the reconnaissance phase and the details of the tentative model to all participants. The nurses offered suggestions to modify the model based on clinical practice. The discussion primarily highlighted nurses' limited time to implement all aspects of the model and the need for specialized PR nurses to undertake selected PR-related tasks. Participants also suggested increasing physicians' involvement by discussing PR with patients early in hospitalization and providing nurses with additional PR training and resource support. Based on these suggestions, the tentative model was modified before implementation during Cycle 1. The evidence, decisions, and corresponding model changes are summarized in Table 5.

Model Refinement Following Cycle 1: During the reflection phase of Cycle 1, the research team held a group discussion with all nurses in the unit. The discussion identified

several practical difficulties encountered during implementation. The nursing staff shortage and heavy workload limited nurses' ability to undertake some PR-related tasks, leading to the suggestion that nursing interns assist with selected tasks such as patient assessment and data collection. Participants also suggested reducing the documentation required from patients at home because patients often forgot to complete the records or found them difficult to maintain. In addition, many older patients were not accustomed to using WeChat, and daily sharing in the group chat was considered cumbersome. Telephone communication was therefore considered more practical for post-discharge follow-up. These findings informed modifications to the model during the planning of Cycle 2, including greater involvement of nursing interns and telephone-based follow-up. The evidence, decisions, and corresponding model changes are presented in Table 5.

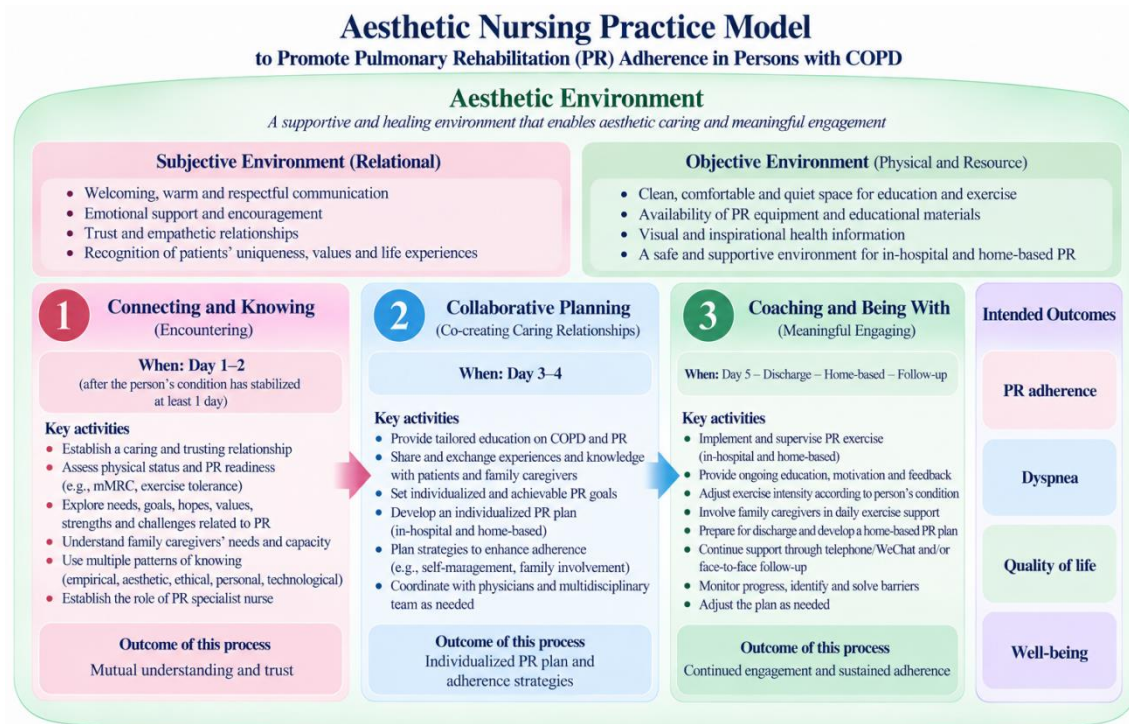
Model Finalization Following Cycle 2: During the final reflection of Cycle 2, the participating nurses did not propose additional modifications to the model. Therefore, no further revisions were made, no third TAR cycle was undertaken, and the model was finalized. The final model is presented in Figure 1.

Table 5. Evidence, Decisions, and Model Refinements Across the TAR Cycles

TAR stage	Evidence identified	Decision	Model changes
Cycle 1: Planning	Nurses were busy with routine clinical work and lacked specialized PR expertise. There was no additional room specifically available for PR activities. Physician involvement was considered important for facilitating PR. Unit nurses had limited time to document PR information, and PR-related information needed to be communicated to responsible nurses.	Modify the tentative model according to the clinical conditions identified during planning.	A PR specialist nurse role was established to undertake patient assessment, develop PR programs, guide and supervise implementation, and provide monthly PR training. Available spaces, including the education/handover room or bedside, were used for PR-related activities. Aesthetic PR Medical Advice was added during Days 1–2. The PR specialist nurse prepared PR prescription forms and shared assessment and PR-plan information with responsible nurses. A PR Specialist Goal-Setting Conference involving the patient, family caregiver, and responsible nurse was added. Nurses checked PR task information during each shift and shared information during handover. The specialist nurse categorized follow-up information and shared it with nurses. A Resource Navigation Map, nurse recognition/certificates, monthly PR training, and PR-related pictures were added.

Cycle 1: Acting, Observing, and Reflecting Cycle 2: Planning	During Cycle 1, PR specialist nurses remained busy because of other duties. Information posted in the group chat did not always reach responsible nurses. Nurses had difficulty arranging the planned 10-minute tripartite goal-setting meetings. Patients were not accustomed to completing rehabilitation tracking and self-reflection forms, and family caregivers were also busy. WeChat-based sharing and gamification were difficult for many older patients and cumbersome to implement. Permanent display of PR pictures was restricted by ward cleanliness and order requirements.	Based on the problems identified during Cycle 1 and discussed during reflection, modify the corresponding implementation strategies for use in Cycle 2.	Interns were added to assist with patient assessment and data collection. In addition to the group chat, the PR specialist nurse sent information directly to the assigned nurse. The formal 10-minute goal-setting meeting was changed to verbal confirmation by the responsible nurse or interns. The Daily Rehab Tracker and Self-Barriers Log were replaced by telephone calls by interns three times per week beginning in the first week after discharge for monitoring and verbal review/reflection. Recovery narratives were shared by nurses during routine nursing practice rather than through organized WeChat sharing. WeChat gamification was removed. PR pictures were displayed only when needed. Family caregivers continued to participate, but no specific records were required. The color-coded Daily Rehab Tracker was removed.
Cycle 2: Acting, Observing, and Reflecting	The model revised following Cycle 1 reflection was implemented during Cycle 2. At the final reflection, participating nurses did not propose additional modifications to the model.	No further modification was made.	The model was finalized after Cycle 2, and no third TAR cycle was undertaken.

Figure 1. The Model of Aesthetic Nursing Practice to Promote Adherence to PR for Persons with COPD



Discussion

This study offers insights into how researchers, guided by a literature review and theoretical frameworks, analyzed the actual conditions at the study site and, by integrating participants' experiences, reflections, and feedback, developed a nursing practice model designed to support patient adherence to PR through an iterative revision process. The focus of this study is not on validating the model's effectiveness, but rather on illustrating its development and refinement, explaining how its components were adapted to support PR adherence within the clinical context, and describing the evolving role of nurses throughout the research process. Therefore, the findings should be interpreted as evidence of model development and contextual adaptation rather than evidence of improved PR adherence or patient outcomes.

Contextualized Model: AesNURP theory provided a theoretical lens for integrating evidence from the literature and multiple stakeholders, enabling the model to be developed in a theoretically grounded and contextually relevant manner. The nursing practice model developed in this study is not a standardized protocol, but rather one that emerged through the various stages of AR and was continuously refined through clinical practice. This is consistent with recommendations from previous studies, which emphasize the need for personalized, practical PR interventions [12]. Research has shown that AR is rooted in specific clinical practice and plays a crucial role in driving improvements in nursing practice [27]. The TAR process enabled the model to draw not only on theory and the literature but also on participants' experiences, perceptions, and reflections. Research indicates that reflection on nursing practice can contribute to the development of nursing knowledge [28].

Consistent with this perspective, reflection was incorporated throughout the TAR process in this study to support the iterative refinement of the model.

Our research also indicates that aesthetic nursing practice theory is not merely a nursing technique but can be integrated into the clinical nursing process, enabling nurses to understand patients holistically, collaboratively develop nursing interventions, and jointly implement and reflect on care plans. During PR, the model emphasized nurses' attention to the feelings and experiences of patients and their family caregivers and encouraged their participation in care planning and implementation.

Key Factors Supporting Model Implementation: An important factor supporting model implementation was the involvement of PR specialist nurses and nursing interns. Research in China indicates that PR nurses are eager to become more involved in PR care, and a PR program designed around existing factors would help them better adapt to their roles as PR nurses [29]. In this study, PR specialist nurses were assigned key responsibilities in the implementation of the model, including PR assessment, planning, guidance, and supervision.

Previous research has shown that nursing students provide positive and effective support and influence to the department and registered nurses during their rotations [30]; another study reached a similar conclusion [31]. A recent study has also shown that involving student nurses in patient care early can effectively improve a department's capacity to handle patient admissions and enhance patient satisfaction. Student nurses themselves also report feeling a greater sense of accomplishment and belonging [32].

The modifications made during model development reflected a process of contextual refinement rather than the addition of new intervention components. For example, clarifying professional roles, optimizing available workforce resources, simplifying documentation, and adapting follow-up methods were intended to improve the model's compatibility with routine clinical practice, which is essential for successful intervention development and implementation [33]. Similarly, continuous refinement based on stakeholder feedback and the local clinical context is consistent with implementation research highlighting the importance of tailoring strategies to local context [34].

The Nurse's Role Changes: One contribution of this study is that the TAR process positioned nurses not merely as implementers of intervention plans but as active participants in the development and refinement of nursing practice, shifting their involvement from one-way delivery of nursing interventions toward a more reflective and relationship-centered approach. Within the TAR process, nurses were encouraged to attend more closely to the experiences of patients and family caregivers and to participate in collaborative discussion and reflection. This is consistent with the research's emphasis on reflection to improve nursing practice [28], the evolving role of nurses in AR, and the notion that AR enables nurses to continuously improve their clinical practice [27]. AR is an ongoing, cyclical process that does not end with the conclusion of the study, and intervention strategies may continue to evolve in response to the ever-changing clinical environment.

Implications for Nursing Practice and Health Policy

The model developed in this study may provide practical guidance for nurses seeking to integrate PR adherence-supportive practices into routine nursing care. This study

highlights the need for multi-stakeholder engagement in transforming nursing practice, as well as the importance of nurses' active participation and reflection.

Moreover, we emphasize the need to adopt a diversified strategic approach to development, avoiding the confinement of nurses to the role of merely following protocols. Nursing leadership may consider policies that give nurses opportunities to contribute to practice development and innovation. At the organizational level, supportive policies and leadership may facilitate the adaptation of nursing practice models to local clinical conditions and encourage nurses' participation in practice development.

Strengths and Limitations

The greatest strength of this study lies in the fact that, based on the actual conditions at the research site, the researchers took the lead in collaborating with various stakeholders to jointly design a nursing practice model aimed at promoting PR adherence in persons with COPD. This study synthesized the existing literature and drew on the practical experiences of clinical nurses, patients, and their families, refining the model through nurses' reflections and feedback. This approach incorporated perspectives from multiple stakeholders and positioned nurses as active participants in the model-development and refinement process.

This study has several limitations. First, it was conducted in a single respiratory department in one tertiary hospital in China. The model was developed in response to the staffing structure, workflow, available resources, and clinical context of this setting; therefore, its applicability to other hospitals or healthcare systems requires further evaluation. Second, because the researcher actively facilitated the TAR process and had prior familiarity with the study setting and nursing staff, researcher influence on participants' discussions, reflections, and model-development decisions cannot be excluded, although reflexivity, multiple data sources, and research-team review were used to enhance rigor. Third, the study focused on the development and iterative refinement of the model within the study period, and longer-term implementation and sustainability after completion of the TAR cycles were not examined. Finally, changes in PR adherence and other patient outcomes are not reported in the present model-development paper. Therefore, the findings should not be interpreted as evidence of the model's effectiveness. Separate reporting of outcome evaluation and future studies are needed to examine the model's effectiveness, implementation, and longer-term sustainability across clinical settings.

Conclusions

A comprehensive and systematic PR adherence program is crucial for both patients and healthcare providers. This study demonstrated how nurses, through iterative reflection and action and in collaboration with multiple stakeholders, contributed to the development and contextual refinement of an AesNURP-based nursing practice model within the study setting. The model was adapted to the existing clinical environment, workforce, and routine nursing practice without requiring high-technology solutions or large-scale organizational changes. Because the study focused on model development and refinement, the present report does not assess the model's effects on PR adherence and patient outcomes.