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Developing a Model for Aesthetic Nursing Practice in Promoting Adherence to Pulmonary Rehabilitation among Persons with Chronic Obstructive Pulmonary Disease in China; a Technical Action Research

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Abstract

Aims: This study aimed to develop a model of aesthetic nursing practice to promote adherence to pulmonary rehabilitation through technical action research.

Ideas & Methods: Guided by the philosophy of pragmatism and the theory of Aesthetic Nursing Practice, a nursing model to support pulmonary rehabilitation adherence was developed in a respiratory care unit of a tertiary hospital in Guiyang, China, between August 2025 and March 2026. Aesthetic Nursing Practice provided substantive knowledge for the model development process through the aesthetics in nursing processes, encountering, co-creating caring relationships, and meaningful engagement, along with the phases of reconnaissance and technical action research: planning, acting and observing, and reflecting; it was also used to structure the components and interventions of the model. Twelve nurses, 12 persons with chronic obstructive pulmonary disease, and 11 family caregivers were interviewed during reconnaissance, and 41 nurses took part in two iterative technical action research cycles.

Findings: The developed model consisted of three processes of aesthetic nursing practice; Connecting and Knowing, Collaborative Planning, and 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 pulmonary rehabilitation 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 specific clinical context of the study site; further research is needed to examine its implementation and longer-term sustainability across different clinical settings.

Keywords

Pulmonary Disease, Chronic Obstructive [https://www.ncbi.nlm.nih.gov/mesh/68029424];
Treatment Adherence and Compliance [https://meshb.nlm.nih.gov/record/ui?ui=D000074822];
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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 term. Recent clinical practice guidelines provide detailed recommendations for the delivery of PR and strongly recommend it for adults with stable COPD [4].

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

Factors that may influence PR uptake and participation include an individual's educational level, PR difficulty, exercise habits, and willingness to participate in PR [10]; psychological factors, health literacy, and interpersonal dynamics [8]; emotional distress, perceived ineffectiveness, lack of support, and 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]; and healthcare-system factors and collaboration among healthcare providers [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], and 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, the 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, TAR was selected because it enables researchers 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". The study aimed to develop a site-specific model to support adherence to PR by integrating pragmatism, TAR, and AesNURP Theory, thereby demonstrating 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.

Ideas and Methods

Philosophical and theoretical framework

Pragmatism guided the researchers' perspective on the use of research methodology and of a new model 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 researchers to integrate theoretical knowledge with participants' experiences and feedback from clinical practice [18]. AesNURP theory provided substantive knowledge for conducting the model development process through aesthetic practices in nursing [19], along with the AR phases, and was also used to structure the model's components and interventions for nursing practice.

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]. Scholars have since 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. 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, in which 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] and provides a comprehensive framework for developing and applying models within such settings. Before this study, the researchers had concluded, based on a literature review and site analysis, that persons with COPD at the study site had low adherence to PR. 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 assumptions: 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, reflecting the concrete wholeness and constantly dynamic nature of the human person; 3) persons co-create aesthetic expressions in nursing: the caregiver and the care recipient jointly construct aesthetic expression and co-create an aesthetic care experience; 4) persons mutually interact with the environment, influencing one another; and 5) aesthetics in nursing is within an aesthetic nursing environment: aesthetic quality, humanistic care, and aesthetic nursing practice can only be realized within a warm, comfortable, and respectful aesthetic nursing environment.

AesNURP consists of three main processes. The first, encountering, 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; the theory identifies five patterns of knowing that explain how nurses can better understand and perceive patients: aesthetic, personal, empirical, ethical, and technological knowing. The second, co-creating a caring relationship, requires nurses to participate in and co-create the caring process with the cared-for person to improve the quality of care and achieve synchronized care, which depends on mutual tolerance, understanding, support, and trust. The third, meaningful engaging, holds that 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. Because the PR program at the study site lacked a holistic approach, collaborative creativity between nurses and patients, and aesthetic elements, AesNURP was used to construct the PR model.

AesNURP theory was used in two ways in this study. First, its practice processes guided the research activities in each AR phase [18, 19]. Reconnaissance corresponded to encountering: researchers explored and engaged with participants to understand their experiences and expectations, gathered baseline data through interviews to identify challenges and recommendations in current nursing practice, built trust, and developed an understanding of the aesthetic nursing environment. Planning corresponded to co-creating caring relationships: nurses and the research team collaboratively defined and revised the model's core components, principles, and goals so that they met clinical practice requirements and aligned with aesthetic nursing theory. Acting and observing and reflecting corresponded to meaningful engaging: the model was applied in real clinical contexts with the meaningful participation of patients, family caregivers, and nurses, while the research team prepared materials and helped address challenges; nurses, patients, and caregivers then reflected on the model's feasibility, relevance, and areas for improvement, and the model was revised as needed. Second, the substantive knowledge of AesNURP was translated into nursing practice in the model (Table 1).

Study design and setting

This TAR study was conducted in the respiratory care unit of a tertiary hospital in Guiyang, China, between August 2025 and March 2026. 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; they were not tailored to individual needs, and motivation to participate in and sustain PR was limited among healthcare professionals and patients.

The model development process included the following stages. During the reconnaissance phase, the Medical Subject Headings (MeSH) terms "COPD", "pulmonary rehabilitation", and "adherence" were used to search the literature systematically; factors influencing PR adherence among persons with COPD were analyzed and synthesized, and a tentative model was developed based on AesNURP theory. Qualitative descriptive data were also collected through face-to-face individual interviews on participants' (nurses, patients, and 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, and the revised model was implemented during Cycle 2. As no additional modifications were proposed during the final reflection of Cycle 2, the model was finalized.

Participants and recruitment

During the reconnaissance phase, purposive sampling was used to recruit participants through three 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 within the unit; and 3) posting recruitment notices in prominent locations within the unit. Only participants who voluntarily agreed to take part were enrolled.

Nurses were eligible if they 1) were registered nurses with more than five years' experience in a general respiratory unit, to ensure sufficient clinical experience to reflect on current PR practice, and 2) had documented attendance at PR training or relevant certification, ensuring both clinical insight into COPD care and the specialized expertise needed to provide rich, informed interview data. Patients were eligible if they 1) had been diagnosed with acute exacerbation of COPD (AECOPD) by a physician at admission; 2) were clinically stable with a post-bronchodilator FEV_1 ≥50% of the predicted value; 3) had participated in a PR program within the past year or had self-directed PR experience; 4) were aged ≥18 years, able to communicate in Mandarin, and able to use WeChat; and 5) resided in Guiyang City. Patients were excluded if they had any of the following conditions at admission: pneumothorax, acute pulmonary embolism, acute aortic aneurysm and coarctation, acute ischemic heart disease, malignant tumors, or acute stroke, as determined from medical records and physician diagnoses. Family caregivers were eligible if they 1) were a family member who had provided care as the primary caregiver for the patient with COPD for more than six months, 2) were older than 18 years and able to record simple text or pictures, and 3) were able to consistently fulfill the caregiver role during the study period; caregivers with severe chronic diseases such as hypertension, diabetes mellitus, heart disease, or kidney disease were excluded.

For the TAR phase, all nurses working in the unit were invited to participate. In total, the reconnaissance phase included 12 nurses, 12 patients, and 11 family caregivers, and 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.

Model development 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 and was therefore familiar with the PR program and the nursing staff. In the first phase, the first author reviewed the literature and held multiple meetings with the head nurse and clinical nurses at the study site to understand actual clinical conditions. Under the guidance of the second author, an initial model was constructed based on AesNURP theory and the literature review and was revised following feedback from the proposal defense panel.

Reconnaissance. Following ethical approval, the study commenced with a two-month reconnaissance phase (encountering; early August to early October 2025) to understand the existing PR practice and identify factors influencing adherence within the study setting. Building on the tentative model developed from the literature review, 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. Routine clinical practice was also observed, and reflective field notes were maintained throughout. 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 then refined through two iterative TAR cycles conducted from early October 2025 to the end of March 2026, each comprising planning, acting, observing, and reflecting.

Cycle 1. Cycle 1 was conducted from early October 2025 to early January 2026. During planning, 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), focusing on the feasibility of implementing the model in routine clinical practice and the modifications needed before implementation. During acting and observing, all 41 nurses implemented the tentative model in routine nursing practice 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, visiting the study site every day to provide implementation support, observe clinical practice, and document implementation experiences and practical issues through observational records, reflective field notes, meeting records, and relevant implementation documents.

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 attended the planning meeting. Participants reflected on their experiences, discussed problems encountered, and proposed modifications for the next cycle, and meeting records documented the issues discussed and the proposed modifications. These data were reviewed together with the other records to identify implementation problems, participants' recommendations, and components of the model requiring modification, which informed revision of the model before Cycle 2.

Cycle 2. Cycle 2 was conducted from early January to the end of March 2026. Planning was based on the findings of the Cycle 1 reflection; the research team reviewed the implementation problems and recommendations and revised the model before the second cycle began. The three core processes and their sequence were retained, while specific implementation strategies were modified to improve their feasibility within routine clinical practice.

All 41 nurses implemented the revised model, with the researcher again facilitating implementation, observing clinical practice, documenting implementation experiences, and maintaining reflective field notes. 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 were required. At the end of Cycle 2 in late March 2026, a final group reflection was conducted and documented through meeting records, which were reviewed together with observational records, reflective field notes, and implementation documents. Because the participating nurses did not propose additional modifications, no further revision was made, no

third TAR cycle was undertaken, and the model was finalized.

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

Data analysis

NVivo software [22] was used to facilitate data organization, management, and coding, 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, by (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, and 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, linking evidence arising from implementation and reflection to the corresponding decisions and modifications made to the model.

Trustworthiness and rigor

Lincoln and Guba's four criteria of trustworthiness were adopted [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; and researcher reflexivity was maintained through ongoing self-reflection and reflective field notes. The accuracy of the reconnaissance interview data was supported through verbatim transcription and repeated review of the transcripts.

Confirmability was supported by systematic data management in NVivo, documentation of coding and analytic decisions, an audit trail linking the original data, interpretations, and model-development decisions, and regular peer review and debriefing with members of the research team. 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.

Findings

Participant characteristics

During the reconnaissance phase, 12 nurses (all female; mean age: 33.3 years), 12 persons with COPD (all male; mean age: 66.1 years), and 11 family caregivers (81.8% female; mean age: 55.4 years) participated in individual interviews. A total of 41 nurses (95.1% female; 82.9% with a bachelor's degree) participated in both TAR cycles, including the 12 nurses who participated in the reconnaissance interviews (Table 2).

Table 1. Aesthetic Nursing Practice to nursing practice theory-based nursing practice in the model

Substantive knowledge in Aesthetic Nursing Practice to nursing practice theory [19]	Translation of Aesthetic Nursing Practice to nursing practice in the model
Five assumptions	
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 pulmonary rehabilitation programs.
2. Ideal of wholeness as a perspective of oneness	Treats patients as holistic beings by addressing their physical, emotional, and psychological needs, reflecting a holistic approach to pulmonary rehabilitation.
3. Persons co-create aesthetic experiences	Actively involves patients in designing and personalizing their pulmonary rehabilitation 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, including reducing barriers such as anxiety-inducing settings and optimizing the physical space to promote engagement in pulmonary rehabilitation activities.
5. Aesthetics in nursing is within an aesthetic environment	Nurses design visually and emotionally pleasant rehabilitation spaces to create comfort and security, and 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, including 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, enabling individual needs and personal rehabilitation goals to be incorporated into pulmonary rehabilitation planning.
3. Meaningful engagement	Nurses encourage patients to participate actively in their care by integrating motivational strategies and aesthetic experiences into pulmonary rehabilitation; for example, nurses use guided imagery or mindfulness to enhance engagement in breathing exercises.
Aesthetic environment	
1. Subjective domain	Incorporates patients' internal experiences, emotions, and values into the care process; for instance, nurses understand how patients feel about their pulmonary rehabilitation journey and adapt interventions accordingly.
2. Objective domain	Creates physically comfortable and visually appealing pulmonary rehabilitation settings, including calming colors, adequate lighting, and a spacious arrangement to support movement and relaxation.

Table 2. Characteristics of the participants in the reconnaissance phase and the TAR cycles

Characteristic	Nurses, reconnaissance (n=12)	Persons with COPD (n=12)	Family caregivers (n=11)	Nurses, TAR cycles (n=41)
Age (years)				
Mean (range)	33.3 (28–40)	66.1 (51–82)	55.4 (36–72)	–
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)
Sex				
Female	12 (100)	0 (0)	9 (81.8)	39 (95.1)
Male	0 (0)	12 (100)	2 (18.2)	2 (4.9)
Education				
Primary school	–	3 (25.0)	–	–
Middle school	–	8 (66.7)	–	–
Junior college	–	1 (8.3)	–	–
Below bachelor's degree	1 (8.3)	–	8 (72.7)	–
College diploma	–	–	–	6 (14.6)
Bachelor's degree	10 (83.3)	–	3 (27.3)	34 (82.9)
Master's degree	1 (8.3)	–	–	1 (2.4)
Experience (years)				
Nursing experience	10.0 (5–17)	–	–	10.76±6.00
COPD duration	–	11.7 (3–25)	–	–
PR participation	–	2.6 (1–5)	–	–
Relationship to person with COPD				
Partner	–	–	4 (36.4)	–
Daughter	–	–	5 (45.5)	–
Son	–	–	2 (18.2)	–

COPD, chronic obstructive pulmonary disease; PR, pulmonary rehabilitation; TAR, technical action research. Values are n (%), mean (range), or mean±standard deviation. Twelve of the 41 nurses in the TAR cycles also participated in the reconnaissance interviews.

Table 3. Evidence, decisions, and model refinements across the technical action research cycles

Technical action research stage	Evidence identified	Decision	Model changes
Cycle 1: Planning	Nurses were busy with routine clinical work and lacked specialized pulmonary rehabilitation expertise. There was no additional room specifically available for pulmonary rehabilitation activities. Physician involvement was considered important for facilitating pulmonary rehabilitation. Unit nurses had limited time to document pulmonary rehabilitation information, and pulmonary rehabilitation-related information needed to be communicated to responsible nurses.	Modify the tentative model according to the clinical conditions identified during planning.	A pulmonary rehabilitation specialist nurse role was established to undertake patient assessment, develop pulmonary rehabilitation programs, guide and supervise implementation, and provide monthly pulmonary rehabilitation training. Available spaces, including the education/handover room or bedside, were used for pulmonary rehabilitation-related activities. Aesthetic pulmonary rehabilitation Medical Advice was added during Days 1–2. The pulmonary rehabilitation specialist nurse prepared pulmonary rehabilitation prescription forms and shared assessment and pulmonary rehabilitation-plan information with responsible nurses. A pulmonary rehabilitation Specialist Goal-Setting Conference involving the patient, family caregiver, and responsible nurse was added. Nurses checked pulmonary rehabilitation 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 pulmonary rehabilitation training, and pulmonary rehabilitation-related pictures were added.
Cycle 1: Acting, observing, and reflecting; Cycle 2: Planning	Pulmonary rehabilitation 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 pulmonary rehabilitation pictures was restricted by ward cleanliness and order requirements.	Modify the corresponding implementation strategies for use in Cycle 2, based on the problems identified during Cycle 1 and discussed during reflection.	Interns were added to assist with patient assessment and data collection. In addition to the group chat, the pulmonary rehabilitation 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. Pulmonary rehabilitation 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 the 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 technical action research cycle was undertaken.

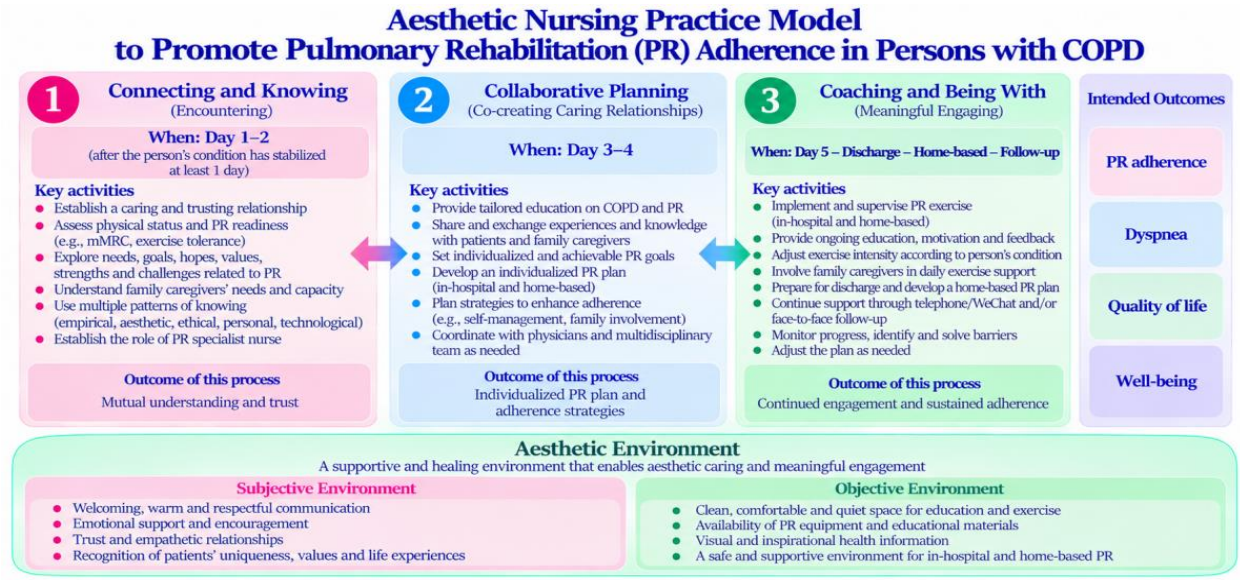

Figure 1. The model of aesthetic nursing practice to promote adherence to pulmonary rehabilitation (PR) for persons with COPD

Factors affecting adherence to PR

The literature review identified several factors that influence patients' adherence to PR, which 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] and 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] 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 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, whereas simple, individualized plans integrated into daily life may be more conducive to long-term adherence [12]. 5) System and contextual factors: these include the competence [8] and attitudes [25] of professionals, 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, poor exercise conditions [11], and healthcare professionals' attitudes towards PR [26]. Promoting adherence to PR is therefore a complex process shaped by individual, behavioral, intervention, and systemic factors.

Model content

Using the influencing factors identified through the 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.

Encountering (Connecting and Knowing). This process occurs during Days 1–2 after the patient's condition has stabilized. It involves initial interactions among nurses, patients, and their families to establish an equal, cooperative, and trusting relationship and to 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:* nurses use aesthetic methods to understand patients' current feelings and experiences regarding PR and the underlying meaning of these expressions; for example, patients are encouraged to express the challenges they encounter during PR through speaking, drawing, or storytelling, and nurses observe facial expressions and body language and listen to patients' words to identify factors (such as anxiety and frustration) affecting PR adherence. *Personal knowing:* nurses develop a clear understanding of their role, responsibilities, and capabilities in PR care and of each patient's unique characteristics (personality, habits, lifestyle, and motivation for PR), and use intuitive insight to identify the preparations and needs required to support adherence for themselves, their patients, and family caregivers. *Empirical knowing:* nurses obtain objective data on patients' clinical symptoms by reviewing medical records, conducting physical examinations, and administering tests, and use scientific knowledge and evidence-based practice to develop rehabilitation plans that address physiological impairments, such as pulmonary function, comorbidities, and physical limitations. *Ethical knowing:* nurses clarify the core values shared by caregivers and patients, respect their autonomy, integrate the patient's habits and preferences into the PR plan, ensure that the plan does not exceed the patient's actual capabilities, and balance rehabilitation needs with the patient's circumstances. *Technological knowing:* nurses assess their own ability to use PR-related equipment and interpret device data, evaluate the patient's and family's understanding of rehabilitation exercises, identify the equipment available in the patient's environment, assess access to medical resources and family support, and identify environmental barriers, preparing the groundwork for a systematic PR program.

Co-creating caring relationships (Collaborative Planning). This process occurs during Days 3–4 after the patient's condition has stabilized. Nurses introduce the tentative PR plan to patients and their family members, and together they 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, and enhance the aesthetic environment. For example, nurses design a PR plan tailored to the patient's circumstances based on the assessment data obtained during encountering. Patients with varying disease severity receive different rehabilitation approaches, with those in more severe condition focusing primarily on breathing exercises, and 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, and nurses also encourage support from family members and peers.

Meaningful engaging (Coaching and Being With). This process extends from the later stage of hospitalization through discharge and long-term home follow-up. Its objective 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, supported throughout by aesthetic and humanistic care. 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 report them to nurses, who offer tailored solutions. Nurses closely monitor patients' 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 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 atmosphere for home-based rehabilitation, extending the aesthetic environment from the hospital to the home.

Model refinement across the TAR cycles

Cycle 1 planning. The reconnaissance findings from nurses, persons with COPD, and family caregivers showed that PR adherence was influenced by multiple interacting factors, including patients' knowledge and beliefs, physical condition and motivation, family and social support, healthcare professionals' knowledge and support, and organizational, environmental, and resource constraints. Participants emphasized the need for individualized and structured PR programs, clearer and more accessible education, continuous professional guidance and follow-up, family involvement, and multidisciplinary collaboration. These findings informed Cycle 1 planning by identifying key barriers and support needs to address when developing the AesNURP-based PR adherence model. Based on these results, the research team held a group discussion with all nurses in the unit, presented the reconnaissance findings and the details of the tentative model, and invited suggestions for modification 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 (Table 3).

Cycle 1 reflection. During the reflection phase of Cycle 1, the group discussion with all nurses identified several practical difficulties. 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, so telephone communication was 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 (Table 3).

Cycle 2 reflection. During the final reflection of Cycle 2, the participating nurses did not propose additional modifications; therefore, the model was finalized without a third TAR cycle. The final model is presented in Figure 1.

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 was not on validating the model's effectiveness but 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.

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 model is not a standardized protocol but one that emerged through the various stages of AR and was continuously refined through clinical practice, consistent with previous studies emphasizing the need for personalized, practical PR interventions [12]. 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, and since reflection on nursing practice can contribute to the development of nursing knowledge [28], reflection was incorporated

throughout the TAR process to support the iterative refinement of the model. A distinctive feature of this study was that the three AesNURP processes were incorporated into the corresponding phases of TAR, allowing the theory to guide not only the content of the model but also the model-development process. This integration provided a structured way to connect encountering, co-creating caring relationships, and meaningful engaging with reconnaissance, planning, acting and observing, and reflecting throughout the two TAR cycles. The findings also indicate 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.

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 that a PR program designed around existing factors would help them adapt to their roles [29]; in this study, PR specialist nurses were assigned key responsibilities in implementing the model, including PR assessment, planning, guidance, and supervision. Previous research has shown that nursing students provide positive and effective support to the department and registered nurses during their rotations [30, 31], and that involving student nurses in patient care early can improve a department's capacity to handle patient admissions and enhance patient satisfaction, while the students report 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. 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].

A further 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 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, consistent with the emphasis on reflection to improve nursing practice [28] and with 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 changing clinical environment.

In terms of implications for nursing practice and health policy, the model 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 and the importance of nurses' active participation and reflection. A diversified approach to practice development is needed that avoids confining nurses to the role of merely following protocols. Nursing leadership may consider policies that give nurses opportunities to contribute to practice development and innovation, and supportive organizational policies and leadership may facilitate the adaptation of nursing practice models to local clinical conditions.

The main strength of this study is that, based on the actual conditions at the research site, the researchers collaborated with various stakeholders to jointly design a nursing practice model aimed at promoting PR adherence in persons with COPD, synthesizing the existing literature, drawing on the practical experiences of clinical nurses, patients, and their families, and refining the model through nurses' reflections and feedback. This study also has several limitations. First, it was conducted in a single respiratory department in one tertiary hospital in China, and the model was developed in response to the staffing structure, workflow, available resources, and clinical context of this setting; its applicability to other hospitals or healthcare systems therefore 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 this model-development paper; therefore, the findings should not be interpreted as evidence of the model's effectiveness. The outcome evaluation will be reported separately, and further research is

warranted to examine the longer-term sustainability and transferability of the model across different clinical settings.

Conclusion

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. The study also illustrates the use of AesNURP as a theory-based research process, in which encountering, co-creating caring relationships, and meaningful engaging were integrated with the TAR phases to guide the development and refinement of the model. Because the study focused on model development and refinement, the results of the model evaluation, including changes in PR adherence and other patient outcomes, are not reported here and will be reported separately.

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Ethical Permissions: This study was approved by the Medical Ethics Committee of the Affiliated Hospital of Guizhou Medical University (approval number: 2025116k) and by the Institutional Review Board of the Center for Social and Behavioral Sciences, Prince of Songkla University (approval number: 2025-St-Nur-022 [Internal]). The broader doctoral research project included both model development and outcome evaluation; however, the present study focuses exclusively on the development and iterative refinement of the model, and the outcome evaluation data are not reported here. Written informed consent was obtained from all participants after a detailed explanation of the study's objectives, procedures, safety, intended use of data, and their right to withdraw. Questionnaires and clinical data were anonymized, research materials were stored on a password-protected computer, and data will be retained for at least five years and used solely for this academic study.

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