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Application of active cycle of breathing technique

Submission date
28/09/2025

Recruitment status
No longer recruiting

Registration date
21/10/2025

Overall study status
Completed

Last Edited
15/10/2025

Condition category
Respiratory

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[X] Record updated in last year

Plain English summary of protocol

Background and study aims
This study aims to evaluate the effectiveness of the active cycle of breathing technique (ACBT) based on the nurse–patient consensus model in improving pulmonary rehabilitation outcomes for patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD).

Who can participate?
Patients aged 18 years and over with acute exacerbation of chronic obstructive pulmonary disease

What does the study involve?
Patients were randomly divided into two groups:
Control Group: In addition to standard treatments, conventional chest physiotherapy was performed, and patients received daily monitoring, education, guidance and care. Standardised instructions were provided upon discharge, with regular follow-up 1 month later.
Experimental Group: Active cycle of breathing techniques exercises under the nurse–patient consensus model were implemented in addition to the intervention measures provided to the control group.

What are the possible benefits and risks of participating?
The Active Cycle of Breathing Technique (ACBT), based on a nurse-patient consensus model, may improve dyspnea, cough, and sputum symptoms in patients with AECOPD. It may also improve quality of life and reduce anxiety and depression.

Where is the study run from?
The First Affiliated Hospital of Wannan Medical College (China)

When is the study starting and how long is it expected to run for?
October 2023 to June 2025

Who is funding the study?
Construction and application of respiratory function training management program for lung cancer patients based on the integration theory of health behavior change (ID: WK2024ZQNZ74)

Who is the main contact
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Study information

Scientific Title
Randomized controlled trial of active cycle of breathing techniques under the nurse–patient consensus model for pulmonary rehabilitation of patients with acute exacerbation of chronic obstructive pulmonary disease

Study objectives
This study aims to evaluate the effectiveness of the active cycle of breathing technique (ACBT) based on the nurse–patient consensus model in improving pulmonary rehabilitation outcomes for patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD).

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 15/07/2025, Scientific Research and New Technology Ethics Committee of Yijishan Hospital of Wannan Medical College (No. 2, Zheshan West Road, Wuhu, 241001, China; +86 553-5739125; yjshrd@126.com), ref: 2025LSY143

Study design
Randomized controlled trial

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Acute exacerbation of chronic obstructive pulmonary disease

Interventions
Patients were randomly divided into two groups: an experimental group (n = 38) and a control group (n=39) using a random number table.

SPSS 26.0 software was used to generate a random number sequence, and patients were assigned to the study group according to the order of the generated sequence.

Control Group:
In addition to standard treatments, conventional chest physiotherapy was performed, and patients received daily monitoring, education, guidance and care. Standardised instructions were provided upon discharge, with regular follow-up 1 month later.
Conventional chest physiotherapy:
1. Abdominal breathing: Semi-recumbent position with hands on upper abdomen to feel abdominal movement
2. Pursed-lip breathing: Inhale through nose, exhale through pursed lips (as if whistling), while tightening the abdomen and exhaling slowly. The ratio of exhalation to inhalation time should be 1:2 or 1:3
3. Effective coughing: In a seated forward-leaning position, the patient took a deep breath, followed by 2–3 seconds of breath-holding, then simultaneously contracted the chest and abdominal muscles to produce 2–3 consecutive coughs. If no sputum is expelled, repeat for 2-3 cycles.
4. Percussion: For patients without contraindications, chest percussion was performed twice daily (morning and evening) using a silicone percussion device. Each session lasted 3–5 minutes at a frequency of 120–180 beats per minute.

The above chest physiotherapy methods were performed twice daily for 10–15 minutes per session, using a one-on-one bedside teaching format where patients and their families participated together.

Follow-up involved patients continuing pulmonary rehabilitation exercises twice daily after discharge, with the option to contact the healthcare team at any time if needed, and a follow-up assessment conducted 1 month post-discharge.

Experimental Group:
Active cycle of breathing techniques exercises under the nurse–patient consensus model were implemented in addition to the intervention measures provided to the control group.
1. Preliminary preparation: A project team was formed and a standardised operating procedure was established.
2. The nurse–patient consensus model was performed as follows.
2.1. Assessment consensus: Admission assessments included patient self-evaluation (sputum volume, expectoration difficulty, ACBT familiarity) and clinical evaluation (auscultation, dyspnoea scoring). The patients were guided through one ACBT session, their performance was assessed and corrections were provided as needed.
2.2. Concept consensus: The ACBT educational video was played, and printed materials were distributed based on the assessment results.
2.3. Programme consensus: Individualised training plans were developed collaboratively.
3. The ACBTs were performed as follows.
3.1. Breathing control training: Patients relaxed their shoulders, neck, arms and abdominal

muscles, placing one hand on the sternum and the other on the navel. They inhaled through the nose, keeping the chest still as the abdomen rose, then exhaled slowly, allowing the abdomen to fall and trying to expel as much air as possible.
3.2. Extended chest breathing training: Patients performed 3–5 deep breaths, actively inhaling and passively relaxing while exhaling, with one hand placed on the chest to feel the expansion during inhalation. After inhaling through the nose, they held their breath for 3 seconds at the end of inhalation, followed by slow exhalation through the mouth.
3.3. Forced expiration technique training: This involved 1–2 huffing actions, starting from moderate lung capacity and continuing to low lung capacity, followed by coughing or an effective cough and then abdominal breathing before restarting. Each method was repeated 3–5 times per session.

Patients alternated between breathing control and chest expansion exercises twice, then performed breathing control and forced respiration twice to complete one cycle. Daily intervention guidance was provided twice, with 3–5 cycles per session, adjusted for patient comfort. The number of repetitions and cycle frequency could be flexibly adjusted based on individual needs. For patients with reduced physical strength, exercises were performed in a semi-sitting position. Patients able to complete the exercises received one-on-one demonstration education, whereas those unable to do so were guided through a gradual approach. After discharge, patients continued the exercises twice daily for 1 month. Follow-up was the same as in the control group.

Intervention Type
Mixed

Primary outcome(s)
1. Sputum volume, sputum viscosity, ease of expectoration, dyspnea severity, comprehension of conventional breathing exercises, familiarity with ACBT, completion of the first ACBT, and perceived importance of pulmonary rehabilitation exercises, measured using a patient-assessed and staff-assessed systematic evaluation questionnaire designed using a nurse-patient model before and after the intervention
2. Dyspnea severity measured using the mMRC Dyspnea Scale before and after the intervention

Key secondary outcome(s))
1. Quality of life assessed using the Chronic Obstructive Pulmonary Disease Assessment Test (CAT) before and after the intervention
2. Anxiety and depression levels assessed using the Hospital Anxiety and Depression Scale (HAD) before and after the intervention

Completion date
30/06/2025

Eligibility

Key inclusion criteria
1. Diagnosis of AECOPD according to the Expert Consensus on the Diagnosis and Treatment of Acute Exacerbation of Chronic Obstructive Pulmonary Disease (2021 Edition) in China
2. ≥18 years
3. Stable vital signs
4. Normal communication abilities and cooperation

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex
Male

Total final enrolment
77

Key exclusion criteria
1. Presence of comorbidities requiring concurrent treatments such as dialysis or chemotherapy
2. Mental disorders
3. Terminal illnesses
4. Use of continuous non-invasive mechanical ventilation

Date of first enrolment
25/12/2023

Date of final enrolment
01/01/2025

Locations

Countries of recruitment
China

Study participating centre
The First Affiliated Hospital of Wannan Medical College
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Sponsor information

Organisation

First Affiliated Hospital of Wannan Medical College

ROR
https://ror.org/05wbpaf14

Funder(s)

Funder type
Other

Funder Name
Construction and application of respiratory function training management program for lung cancer patients based on the integration theory of health behavior change (ID: WK2024ZQNZ74)

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study are not expected to be made available.

IPD sharing plan summary
Not expected to be made available