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ORIGINAL RESEARCH

An Evidence Summary of Health Education in Chronic Obstructive Pulmonary Disease: A Practice-Oriented Assessment with Inter-Rater Reliability

Miao Zhan[1,2], Jing Chen[2,3], Changfu Chen[2], Jiali Zhou[2], Hongying Zhang[1,2]

[1]Department of Science and Education, The Affiliated Rehabilitation Hospital of Chongqing Medical University, Chongqing, 400084, People's Republic of China; [2]School of Nursing, Chongqing Medical University, Chongqing, 400016, People's Republic of China; [3]Department of Breast and Thyroid Surgery, The Second Affiliated Hospital of Chongqing Medical University, Chongqing, 400010, People's Republic of China

Correspondence: Hongying Zhang, Department of Science and Education, The Affiliated Rehabilitation Hospital of Chongqing Medical University, Chongqing, 400084, People's Republic of China, Email 900009@hospital.cqmu.edu.cn

Background: Chronic obstructive pulmonary disease (COPD) is the third leading cause of death worldwide, with a rising burden. Patients are mainly older adults with limited self-management abilities due to low education and cognitive decline. Systematic health education is key to improving disease knowledge and self-management; however, current programs lack standardized content, delivery, and implementation.

Objective: To systematically search, appraise, and synthesize the best evidence on COPD health education, providing healthcare professionals with a rational basis for improving patients' disease knowledge and home-based self-management.

Methods: This study was registered with the Open Science Framework. Following the "6S" evidence pyramid model and a top-down principle, we systematically searched the following databases and websites from inception to November 18, 2025: BMJ Best Practice, UpToDate, Cochrane Library, National Institute for Health and Care Excellence, Registered Nurses' Association of Ontario, Medlive, Guidelines International Network, American Thoracic Society, European Respiratory Society, Global Initiative for Chronic Obstructive Lung Disease, China National Knowledge Infrastructure, Wanfang Data, VIP Database, Sinomed, PubMed, Embase, and Web of Science. We included clinical practice guidelines, systematic reviews, and expert consensus. Quality was assessed using the AGREE II and JBI checklists. Evidence levels and recommendations were determined using the JBI Pre-grading System (2014).

Results: Twenty-one publications were included (nine guidelines, eight systematic reviews, and four expert consensuses). Thirty-one evidence items were extracted and grouped into seven themes: educational principles, providers, recipients, methods, objectives, core content, and outcome assessment.

Conclusion: Effective COPD health education should shift from one-way knowledge transfer to patient-empowerment-based, interactive models. The content must be tailored to local resources, culture, and health literacy. A closed-loop "education-assessment-feedback" system, multidisciplinary teams, and smart technologies are recommended. Future research should focus on resource-limited settings, multidisciplinary implementation strategies and long-term digital intervention outcomes.

Keywords: chronic obstructive pulmonary disease, health education, self-management, multidisciplinary team, patient empowerment

Introduction

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death worldwide, second only to ischemic heart disease and stroke. The global burden of this disease is becoming increasingly severe and is expected to continue growing. According to the Global Burden of Disease Database, the number of patients with COPD is projected to approach 600 million by 2050.[1] The increase in prevalence is highly correlated with the trend of population aging, and the majority of

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patients are elderly individuals. This group often has limited self-management ability due to factors such as low education level and cognitive decline, which poses more severe challenges for disease education and management.[2,3]

Although drug treatment is the basis for alleviating COPD symptoms, the full clinical efficacy of this treatment largely depends on whether patients correctly master the inhalation technique and maintain good compliance. Systematic patient education plays an irreplaceable role in standardizing inhalation behavior and enhancing compliance. Multiple systematic reviews have confirmed that self-management education can effectively improve the quality of life and disease knowledge of patients, and significantly reduce hospitalizations and emergency visits due to respiratory problems.[4–6] Therefore, effective health education strategies have become an indispensable component of comprehensive management plans for patients.

Although the Global Strategy for Chronic Obstructive Pulmonary Disease and the guidelines and statements of the American Thoracic Society/European Respiratory Society on pulmonary rehabilitation emphasize the crucial role of education in COPD management interventions,[7,8] existing studies significantly lack homogeneity in terms of intervention content, implementation methods, and interdisciplinary personnel allocation. This is manifested as follows: (1) in terms of educational content, there are complex multidisciplinary plans covering the entire disease cycle, as well as one-sided publicity focusing only on the use of a single inhaler.[9,10] (2) in terms of educational methods, from traditional offline oral guidance and paper manuals to digital medical and remote follow-up, the forms are diverse but mostly one-way teaching[11,12] and (3) in terms of personnel allocation, the admission standards and responsibilities of multidisciplinary teams are also not clearly defined.[13] This heterogeneity not only causes the research evidence for COPD health education to be scattered but also leads to a lack of standardized implementation plans in clinical practice.

Therefore, to compensate for the lack of scattered evidence and standardized implementation plans, this study adopts an evidence-based approach, systematically searches, evaluates, and integrates evidence in the field of COPD health education, aiming to provide a rational educational basis for clinical medical staff, thereby improving patients' understanding of the disease and enhancing their self-management ability at home.

Materials and Methods

Scheme Registration

The protocol of this study has been registered with the Open Science Framework (OSF). The registration DOI is https://doi.org/10.17605/OSF.IO/UJYRX.

Formulation of the Evidence-Based Question

The PIPOST model was used to frame the evidence-based question:

Population (P): Patients with COPD.

Intervention (I): Health education strategies.

Professionals (P): Healthcare professionals (physicians, nurses, respiratory therapists, pharmacists, nutritionists, etc).

Outcome (O): Disease knowledge level, self-management ability, quality of life, medication adherence, inhalation technique mastery, and acute exacerbation rate.

Setting (S): Hospitals, community health centers, rehabilitation facilities, and home care settings.

Type of evidence (T): Clinical practice guidelines, evidence summaries, systematic reviews and expert consensuses.

Retrieval Strategy

Following the "6S" pyramid evidence model and a top-down search principle, a comprehensive search strategy using subject headings and free-text terms was employed. Databases and websites searched included:

Evidence-based resources: BMJ Best Practice, UpToDate, Cochrane Library.

Guideline development websites: National Institute for Health and Clinical Excellence (NICE), Registered Nurses' Association of Ontario (RNAO), Medlive, Guidelines International Network (GIN).

Professional society websites: American Thoracic Society (ATS), European Respiratory Society (ERS), Global Initiative for Chronic Obstructive Lung Disease (GOLD).

General databases: China National Knowledge Infrastructure (CNKI), Wanfang Data, VIP Database, Sinomed, PubMed, Embase, Web of Science.

The search period was from database inception to November 18, 2025. The specific search methods for all databases and websites are detailedin Appendix 1. Additionally, we manually searched the reference lists of all included guidelines, systematic reviews, evidence summaries, and expert consensus.

Literature Inclusion and Exclusion Criteria

The inclusion criteria were as follows: (1) patients with COPD; (2) focus on COPD health education; (3) study types: clinical practice guidelines, evidence summaries, expert consensus, or systematic reviews (with the most recent version included for guidelines or expert consensus); and (4) published in Chinese or English.

The exclusion criteria were as follows: (1) not in Chinese or English; (2) duplicate publications; and (3) low methodological quality.

Evaluation and Screening Criteria for Literature Quality

Two researchers (MZ and JC) who had received systematic evidence-based medicine training independently conducted literature screening and quality evaluation. Using NoteExpress, they independently evaluated the titles and abstracts based on preset inclusion and exclusion criteria. For the screened literature, full texts were obtained and independently evaluated by the two researchers. Subsequently, the AGREE II tool was used to evaluate the quality of the guidelines, and the Australian JBI standards (2016) were used to evaluate the quality of systematic reviews and expert consensus.

The inter-rater consistency of the title/abstract screening, full-text eligibility assessment, and quality evaluation stages was tested using Cohen's Kappa coefficient,[14] with the Kappa value serving as the effect size. A Kappa value of ≥ 0.81 indicates excellent consistency, 0.61 to 0.80 indicates good consistency, 0.41 to 0.60 indicates moderate consistency, 0.21 to 0.40 indicates average consistency, and ≤ 0.20 indicates poor consistency. Any disagreements that arose during this process were first resolved through consensus discussions; if a consensus could not be reached, the final decision was made by the third senior researcher (HYZ).

Data Synthesis and Classification

During evidence extraction, when the two researchers (MZ and JC) encountered conflicting recommendations, they followed the principle of "prioritizing the most recent, high-quality, evidence-based evidence."

Subsequently, the Australian JBI Evidence Pre-grading System (2014)[15] was used to classify the levels of evidence and determine the strength of recommendations. According to the study design, the evidence was classified into five main levels: Level 1 (experimental designs, including randomized controlled trials), Level 2 (quasi-experimental designs), Level 3 (observational-analytic designs), Level 4 (observational-descriptive designs), and Level 5 (expert opinion or basic research). For each piece of evidence, a corresponding sub-level (eg, 1a, 1b, 5b) was assigned based on the specific document type and original research method. Following the JBI recommendations, after a structured assessment of effectiveness, feasibility, appropriateness, and clinical significance, the strength of recommendation was rated as Grade A (strong recommendation) or Grade B (weak recommendation).

Results

Consistency Test

The Cohen's Kappa coefficient between the two researchers (MZ and JC) was 0.83 (95% CI: 0.79–0.87) for the title/abstract screening stage, and 0.88 (95% CI: 0.82–0.94) for the full-text eligibility assessment and quality appraisal stage, indicating excellent agreement between the two reviewers.

General Characteristics of the Included Literature

A total of 9,825 records were initially identified through the database searches: CNKI (n=96), Wanfang Data (n=332), VIP (n=659), PubMed (n=1,455), Web of Science (n=1,758), Cochrane Library (n=322), SinoMed (n=310), Embase

(n=3,392), BMJ Best Practice (n=272), UpToDate (n=87), NICE (n=60), RNAO (n=5), GIN (n=0), Medlive (n=450), ATS (n=587), ERS (n=20), and GOLD (n=20). Furthermore, all references included in the guidelines, systematic reviews, evidence summaries, and expert consensuses were manually searched, and no other eligible literature was found.

After removing 3,385 duplicate records using NoteExpress, 6,440 records remained eligible for screening. Following title and abstract screening, 6,267 records were excluded, leaving 173 records for full text assessment. After a full text review, 144 records that did not meet the inclusion criteria were excluded, 5 records could not be obtained in full text, and 3 records were excluded because they were not published in Chinese or English. Ultimately, 21 records were included (Figure 1), comprising eight systematic reviews,[5,6,16–21] nine clinical practice guidelines,[22–30] and four expert consensuses (Table 1).[31–34]

Quality Evaluation Results of the Included Literature

Guideline

A total of nine clinical practice guidelines were included, among which two[22,23] were from Web of Science, four[24–26,28] from Wanfang Data, one[27] from Medlive, one[29] from GOLD, and one[30] from BMJ Best Practice The overall quality was good. In addition to Chen et al[23] and Criner et al[22] were grade B recommendations. The rest were recommended at grade A and included. (Table 2).

Systematic Review

A total of eight systematic reviews were included, among which six[5,6,16–18,20] were from PubMed and two[19,21] from CNKI. Among them, all entries in the three articles[19–21] were marked as "yes." Wang et al,[5] Smith et al,[16] Stoilkova et al,[17] Liu et al,[21] and Roberts et al[18] only had the entry "Was the possibility of publication bias evaluated?", which were evaluated as "no" or "unclear", the rest of the items were all "yes", and the overall quality was acceptable Therefore, all high-quality systematic reviews were included (Table 3).

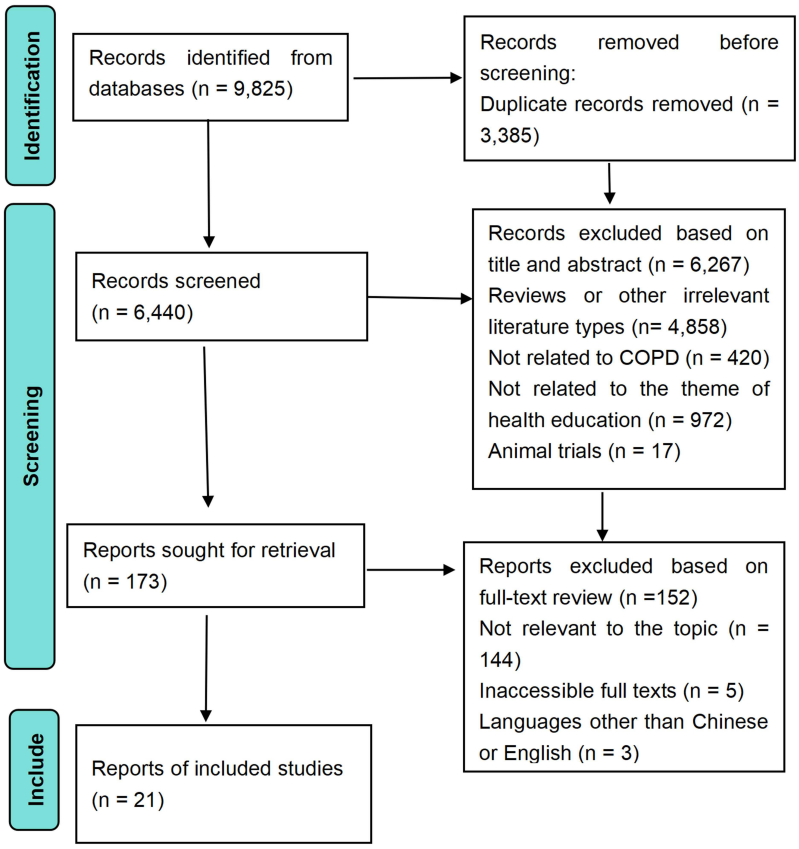

Figure 1 Flow diagram of the article selection process.

Table 1 Basic Characteristics of Included Articles (n=21)

Included Literature	Year	Country/ Organization	Literature Sources	Type of Evidence	Purpose
COPD-X Guidelines Committee[30]	2025	Australia/New Zealand	BMJ Best Practice	Guideline	To provide evidence-based recommendations for COPD diagnosis, function optimization, deterioration prevention, care planning, and exacerbation management for the Australasian context.
Criner et al[22]	2015	Canada	Web of Science	Guideline	To provide evidence-based recommendations for preventing AECOPD, covering non-pharmacological, inhaled, and oral therapies.
Chen et al[23]	2021	China	Web of Science	Guideline	To provide individualized exercise rehabilitation programs for COPD patients, integrating traditional Chinese and Western medicine.
Chinese Thoracic Society et al[24]	2024	China	Wanfang Data	Guideline	To standardize peri-discharge management and follow-up pathways for AECOPD patients, covering hospitalization, discharge, follow-up, and tiered care.
National Institute for Health and Care Excellence[27]	2018	The United Kingdom	Medlive	Guideline	To provide evidence-based recommendations for diagnosing and managing COPD in people aged 16 and older, to improve early diagnosis and quality of life.
Chronic Obstructive Pulmonary Disease Group of Chinese Thoracic Society et al[28]	2021	China	Wanfang Data	Guideline	To provide an updated evidence-based guideline for the diagnosis and treatment of COPD in China
Chinese Medical Association et al[26]	2024	China	Wanfang Data	Guideline	To provide practical guidance for primary care clinicians on screening, diagnosis, comprehensive assessment, management of stable and exacerbated COPD, rehabilitation, and long-term follow-up
China Society of Gerontology and Geriatrics[25]	2023	China	Wanfang Data	Guideline	To provide guidance on risk assessment, intervention, management, and integrated traditional Chinese and Western medicine for elderly COPD patients
Global Initiative for Chronic Obstructive Lung Disease[29]	2026	Global Initiative for Chronic Obstructive Lung Disease	Medlive	Guideline	To provide a global, evidence-based strategy for the diagnosis, management, and prevention of COPD
Salvi et al[33]	2024	India	PubMed	Expert consensus	To develop an evidence-based discharge bundle (7-point strategy) for patients hospitalized for ECOPD to reduce readmission and mortality
Wu et al[31]	2022	China	CNKI	Expert consensus	To provide individualized exercise rehabilitation programs for COPD patients integrating traditional Chinese medicine with modern exercise rehabilitation theory
Chronic Obstructive Pulmonary Disease Group of Chinese Thoracic Society et al[32]	2022	China	Wanfang Data	Expert consensus	To provide expert consensus on identifying and managing patients at high risk for AECOPD, to improve clinical practice
Chen et al[34]	2024	China	Wanfang Data	Expert consensus	To provide full-cycle rehabilitation assessment and treatment guidance for elderly COPD patients based on the ICF framework
Wang et al[5]	2017	China	PubMed	Systematic review	To update systematic review and meta-analysis on the effectiveness of disease-specific self-management education (SME) compared to usual care for COPD patients
Smith et al[16]	2020	Australia	PubMed	Systematic review	To identify the scope of educational topics within PR and their rationale for inclusion, including for diseases other than COPD

(*Continued*)

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Table 1 (Continued).

Included Literature	Year	Country/ Organization	Literature Sources	Type of Evidence	Purpose
Stoilkova et al[17]	2013	Netherlands	PubMed	Systematic review	To systematically review educational topics, methods, professionals involved, and strengths/ weaknesses of educational programs in COPD management interventions
Ammous et al[6]	2024	Germany	PubMed	Systematic review	To evaluate the effectiveness of adherence-enhancing interventions for pharmacological and oxygen therapy in COPD patients and identify the most effective components
Roberts et al[18]	2018	The United Kingdom	PubMed	Systematic review	To systematically review the content and delivery of education within pulmonary rehabilitation (PR) programs
Xu et al[19]	2022	China	CNKI	Systematic review	To systematically evaluate the effect of "Internet Plus" based health education on stable COPD patients
Maricoto et al[20]	2019	Portugal	PubMed	Systematic review	To evaluate the effect of inhaler technique education on clinical outcomes in older adults with asthma or COPD
Liu[21]	2013	China	CNKI	Systematic review	To evaluate the effects of self-management education on health outcomes in COPD patients

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Table 2 Results of the Quality Evaluation of the Guidelines (n=9)

Inclusion of Literature	Percentage of Standardisation in Each Area (%)							
	Scope and Purpose	Participants	Rigour of Formulation	Clarity	Applicability	Editorial Independence	Number of Areas ≥ 60% (nos).	Recommended Levels
COPD-X Guidelines Committee[30]	100	94.4	97.9	100	93.75	100	6	A
Criner et al[22]	100	94.4	97.9	100	43.8	100	5	B
Chen et al[23]	100	88.9	59.7	94.4	95.8	100	5	B
Chinese Thoracic Society et al[24]	100	88.9	88.5	97.2	87.5	95.8	6	A
National Institute for Health and Care Excellence[27]	100	88.9	95.8	97.2	89.6	95.8	6	A
Chronic Obstructive Pulmonary Disease Group of Chinese Thoracic Society et al[28]	97.2	94.4	79.2	97.2	60.4	100	6	A
Chinese Medical Association et al[26]	97.2	91.7	89.6	94.4	72.9	100	6	A
Chinese Society of Gerontology and Geriatrics[25]	97.2	91.7	96.9	91.7	70.8	100	6	A
Global Initiative for Chronic Obstructive Lung Disease[29]	97.2	86.1	87.5	94.4	64.6	100	6	A

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Table 3 Quality Appraisal results of Systematic Reviews (n = 8)

Included Literature	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	Included
Wang et al[5]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Smith et al[16]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Stoilkova et al[17]	Yes	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes	No	Yes	Yes	Yes
Ammous et al[6]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
Roberts et al[18]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Xu et al[19]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maricoto et al[20]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Liu et al[21]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ①Is the review question clearly and explicitly stated? ②Were the inclusion criteria appropriate for the review question? ③Was the search strategy appropriate? ④Were the sources/resources used for the search adequate? ⑤Were the criteria used for appraising studies appropriate? ⑥Was critical appraisal conducted by two or more reviewers independently? ⑦Were measures used to minimize errors in data extraction? ⑧Were the methods used to combine studies appropriate?⑨Was the likelihood of publication bias assessed? ⑩Were recommendations for policy and/or practice supported by the reported data? ⑪Were the directions for future research appropriate?

Table 4 Quality Appraisal Results of Expert Consensuses (n = 4)

Included Literature	Source of Opinion Clearly Identified	Opinion Originates from Influential Experts	Opinion Focuses on the Interests of the Target Population	Conclusion Based on Analytical Process and Logically Expressed	Reference to Existing Literature	Inconsistency with Previous Literature Logically Defended	Included
Wu et al[31]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chen et al[32]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chen et al[34]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Salvi et al[33]	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Expert Consensus

A total of four expert consensuses were included, among which one[33] was from PubMed, one[31] from CNKI, and two[32,34] from Wanfang Data. The evaluation results of all entries were "yes," indicating high quality of the literature, and all were included(Table 4).

Evidence Summary and Description

A total of 31 evidence items related to COPD health education were extracted in this study (Table 5) and categorized into seven themes: (1) principles, (2) providers, (3) recipients, (4) methods, (5) objectives, (6) core content, and (7) outcome assessment. The Cohen's Kappa coefficient for the two researchers' agreement (MZ and JC) on theme assignment was 0.82 (95% CI: 0.73–0.91), indicating a good inter-rater agreement.

Discussion

Through systematic search and quality evaluation, this study ultimately included 21 articles, extracted 31 pieces of evidence, and summarized them into seven themes. The following section discusses this evidence and analyzes the challenges and prospects of clinical application.

Consensus and Differences in Core Topics of Health Education for COPD

Effective health education themes should be determined based on the available evidence, and individualized strategies should be developed by integrating patients' preferences and specific circumstances.

Evidence items 6–30 (Table 5) systematically synthesized the consensus reached in the included literature, clarifying the core content of basic COPD health education, including disease basics, medication and inhalation techniques,

recognition and management of acute exacerbations, pulmonary rehabilitation, smoking cessation, vaccination, nutrition, psychological support, and oxygen therapy. However, there are differences in the coverage and emphasis on educational themes across regions.

In high-income countries and international guidelines, while retaining the above basic themes, the scope of health education has been further extended to more advanced and strategic topics, such as advance care directives and end-of-life care,[29] travel advice,[30] and environmental exposure reduction.[27] These themes reflect the relatively well-developed healthcare infrastructure in these regions, as well as an emphasis on holistic care, patient dignity, and quality of life. In contrast, in low- and middle-income countries, the selection of health education themes is often constrained by practical conditions such as healthcare resource allocation and patients' basic health literacy,[19,26,28] with a greater focus on fundamental and accessible content, such as basic disease concepts and correct use of inhalation devices. This heterogeneity may not reflect a flaw in the study quality but rather differences in healthcare systems, cultural backgrounds, resource accessibility, and disease management philosophies across countries. Taking China as an example, incorporating traditional exercises such as Tai Chi and Ba Duan Jin into education programs as low-cost, culturally adapted alternatives within the pulmonary rehabilitation theme demonstrates a pragmatic orientation under resource-limited conditions.

Therefore, future health education strategies should, on an evidence-based foundation, fully consider regional characteristics, healthcare resource allocation, and individual patient preferences to achieve truly individualized education.

Establishing Patient-Centered COPD Health Education

However, a personalized theme list is only the first step in the educational process. Translating this content into patients' actual actions requires targeted strategies, which is also an inevitable requirement for practicing a "patient-centered" approach.

Evidence item 4 (Table 5) indicates that common methods of health education include verbal instruction, printed materials, video demonstrations, health lectures, and Internet-based remote education.[35] In clinical practice, verbal instructions and printed handouts still dominate. However, Giguère et al[36] conducted a systematic review of 23 high-quality studies and concluded that printed educational materials as a standalone intervention did not significantly improve

Table 5 Summary of Best Evidence for Health Education for Patients with COPD

Primary Headings	Literature Content/Theme	Level of Evidence	Recommended Level
Principles of Health Education	1. Prior to health education, patients' learning needs, preferences, and readiness should be assessed. Professionals should adjust the educational content and methods based on the patient's age, medical condition, literacy level, and health literacy to ensure materials are easy to understand.[16]	1b	A
Education providers	2 Health education should be implemented collaboratively by a trained multidisciplinary team, including specialists, nurses, physical therapists/rehabilitation specialists, clinical psychologists/psychiatrists, pharmacists, and nutritionists.[5,17,18,30]	1b/5b	A
Education Recipients	3. The targets of health education should include the patient, family members, and caregivers.[6]	1b	A
Education Methods	4 Common methods include oral instruction, graphic materials, videos, demonstration-based education, health lectures, and Internet-based remote education.[25] Interactive, face-to-face, individualized, and simple/direct educational approaches are recommended. If telemedicine or similar technologies are used as adjuncts, training and support should be provided, and they should serve as supplementary tools.[6,18–20]	1b/5b	B
Education Objectives	5.The focus should shift from merely transmitting knowledge to promoting behavior change and enhancing self-management skills in patients with COPD.[16,18]	1b	A

(*Continued*)

Table 5 (Continued).

Primary Headings	Literature Content/Theme	Level of Evidence	Recommended Level
Core Themes and Content of Health Education	**Disease Basics**		
	6. Educate patients on accurate disease knowledge, including the definition of COPD, its harm, common triggers, pathogenesis, pathophysiology, typical symptoms and signs, diagnostic methods, and condition assessment.[26,29,30]	5b	B
	Identification and Management of Acute Exacerbations		
	7. Patients should be taught to identify acute exacerbations and master emergency management: (1) Avoid triggers such as smoking, air pollution, occupational exposure, and sudden temperature changes.[28] (2) Instruct patients and caregivers to recognize the common symptoms of acute exacerbation of COPD.[29](3) Teach patients techniques to relieve dyspnea.[22,24]	5b	A
	Disease Treatment and Management		
	8. Educate patients about common medication types (eg, bronchodilators, glucocorticoids, phosphodiesterase-4 inhibitors, expectorants, and antibiotics) and how to recognize and manage their side effects.[26,28]	5b	A
	9. Treatment plans should be individualized based on factors such as symptom severity, frequency of exacerbations in the past year, blood eosinophil (EOS) count, comorbidities, medication side effects, and the patient's ability to use devices.[24,25,29]	5b	A
	Use of Inhalation Devices		
	10. Individualized selection of inhalation devices for COPD requires a comprehensive assessment of the patient's health status, ability to use the device, peak inspiratory flow rate, hand-mouth coordination, accessibility, and cost. The patient's ability to use the device, inspiratory flow rate, and hand-mouth coordination were the most critical factors.[27,28]	5b	A
	11. Instruct patients and family members on the main categories of inhalation devices: pressurized Metered-Dose Inhalers (pMDIs), Dry Powder Inhalers (DPIs), and Soft Mist Inhalers (SMIs).[26] To improve treatment adherence, a single type of inhalation therapy device is preferable whenever possible.[24]	5b	B
	12. Instruct patients on the correct inhalation technique: (1) Before inhalation, patients should cough actively to clear sputum, relax their body, and keep their head upright or slightly tilted back to maintain airway patency. Hold the device without tilting it, exhale fully first, then seal the lips tightly around the mouthpiece. (2) During inhalation, adjust the breathing technique according to the device type: use slow, deep inhalation for pMDIs and SMIs until no more airflow is felt and use rapid, forceful deep inhalation for DPIs until airflow stops. (3) After inhalation, the participants hold their breath for approximately 10 seconds before exhaling.[24]	5b	A
	13. If the inhaled medication contains an Inhaled Corticosteroid (ICS), thorough mouth rinsing is mandatory to remove residual drug from the oral cavity and reduce local side effects.[24]	5b	A
	Oxygen Therapy		
	14. Instruct patients and family members on the correct use of oxygen therapy: (1) Explain the purpose, indications, duration, oxygen flow rate setting, and adjustment criteria for home oxygen therapy to patients and their caregivers.[29] (2) Educate patients and caregivers on safety precautions, including prohibiting smoking during oxygen use or near oxygen equipment, keeping away from open flames, and understanding how to maintain the equipment.[30]	5b	A

(*Continued*)

Table 5 (Continued).

Primary Headings	Literature Content/Theme	Level of Evidence	Recommended Level
	Pulmonary Rehabilitation and Breathing Exercises		
	15. Educate patients about pulmonary rehabilitation, including its definition, benefits, target population, and recommended duration (a program lasting 6–8 weeks yields optimal benefits).[29]	5b	A
	16. Supervised exercise training at least twice weekly is recommended.[29] Emphasize to patients that exercise rehabilitation is suitable for all stages of COPD. Early exercise rehabilitation can improve dyspnea, increase exercise tolerance, alleviate psychological distress, and enhance the quality of life in patients with COPD.[28]	1c/5b	A
	17. Patients should be advised to monitor their blood oxygen saturation during exercise and maintain SpO_2 above 90% with supplemental oxygen, if necessary, to ensure safety.[31]	5b	B
	18. Patients are recommended to perform effective breathing exercises, including pursed-lip and diaphragmatic (abdominal) breathing exercises.[23]	5b	A
	Smoking Cessation		
	19. Patients who smoke are strongly encouraged to quit.[29,32] Smoking cessation significantly slows the decline in lung function, reduces cough and sputum symptoms, improves health-related quality of life, and lowers the risk of acute exacerbations. It is a core intervention for managing COPD.[22,25,34]	5b	A
	20. Recommend personalized approaches based on patients' willingness to quit smoking. The "5A" smoking cessation intervention model is employed for patients willing to quit smoking. For patients not currently willing to quit, use the "5R" motivational enhancement interventions.[25,26,28]	1c/5b	B
	21. Pharmacological intervention is an important component of smoking cessation treatment, primarily including Nicotine Replacement Therapy (NRT) (eg, patches and gum, available over-the-counter), bupropion, and varenicline (the latter two are prescription drugs and require a doctor's guidance).[27–29]	5b	B
	Vaccination		
	22. Vaccination is crucial for preventing acute exacerbations and protecting patients' lives. (1) Recommend annual influenza vaccination for patients with COPD. (2) Recommend SARS-CoV-2 (COVID-19) vaccination (3) Recommend administration of one dose of either the 21-valent pneumococcal conjugate vaccine (PCV21) or the 20-valent pneumococcal conjugate vaccine (PCV20) to reduce the incidence of community-acquired pneumonia and acute exacerbations in patients with COPD. (4) Administer the Respiratory Syncytial Virus (RSV) vaccine to individuals aged ≥50 years and/or those with chronic cardiopulmonary disease. (5) Administer the Tdap (dTaP/dTPa) vaccine to COPD patients who were not vaccinated during adolescence to prevent pertussis, diphtheria, and tetanus. (6) Administer the herpes zoster vaccine to patients with COPD aged >50 years to prevent shingles.[29]	1c/5b	B
	Diet and Nutrition		
	23. Nutritional status assessment includes regular surveys of dietary habits, measurement of Body Mass Index (BMI) and skinfold thickness, and testing of biochemical markers such as serum albumin. Based on the assessment results, an individualized nutritional guidance plan was developed for the patient.[26]	5b	A

(*Continued*)

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Table 5 (Continued).

Primary Headings	Literature Content/Theme	Level of Evidence	Recommended Level
	24. A reasonable diet plays a positive role in improving nutritional status, alleviating symptoms, enhancing physical function, and increasing muscle strength in patients with COPD. The principles of sarcopenia management are as follows: (1) Increase the intake of high-quality protein, particularly proteins rich in branched-chain amino acids, such as leucine, to promote muscle repair and synthesis. Protein should constitute 20% of the total energy intake. (2) Adopt a low-carbohydrate, high-fat diet and increase the content of unsaturated fatty acids, especially n-3 polyunsaturated fatty acids. (3) Encourage the consumption of foods rich in antioxidants (eg, fresh vegetables, fruits, and legumes). Vitamin D supplementation reduces the incidence of moderate and severe acute exacerbations in patients with low serum 25-hydroxyvitamin D levels.[32,34]	1c/5b	A
	Psychological and Emotional Support		
	25. Anxiety and depression are closely associated with COPD. These psychological issues increase the patient burden and affect the quality of life and rehabilitation adherence. Therefore, timely intervention is crucial, including pharmacological (eg, anxiolytics and antidepressants) and non-pharmacological interventions (eg, Cognitive Behavioral Therapy, music therapy, and mindfulness).[24]	1c/5b	B
	26. As patients differ in terms of disease severity, financial situation, family background, education level, and social support, individualized psychological intervention is necessary. This involves a comprehensive assessment of the patient's physiological, psychological, and social data to develop personalized informational, emotional, and family support.[26]	5b	B
	Follow-up and Monitoring		
	27. Pulmonary function tests should be repeated at least once a year.[29]	5b	A
	28. All patients initiating Long-Term Oxygen Therapy (LTOT) should have a follow-up within 60–90 days to reassess SpO_2 and arterial blood gases, and evaluate the efficacy and need for continued therapy. Patients who require continued LTOT should be re-evaluated at least annually. Therapy can be discontinued if reassessment deems it unnecessary to continue.[24]	5b	A
	29. Follow-up for patients with COPD should be comprehensive and systematic. Core components include the following: (1) Symptom assessment: Use standardized tools such as the mMRC or CAT questionnaire to assess dyspnea, cough, sputum, fatigue, activity limitation, and sleep disturbance; record the frequency, severity, type, and cause of acute exacerbations. (2) Treatment-related assessment: Evaluation of the patient's understanding of the treatment plan, medication appropriateness, adverse reactions, inhalation technique, treatment adherence, and effectiveness; assessment of the need for medication or device adjustment and the role of non-pharmacological therapies. (3) Physiological and functional assessment: Pulmonary function testing, exercise tolerance, activities of daily living, BMI, pulse oximetry, and nutritional and psychological status. (4) Comorbidity and complication screening: Focus on other comorbidities, such as cardiovascular disease, osteoporosis, and malnutrition, with a comprehensive annual check-up. (5) Lifestyle and other factors: Assess smoking status and willingness to quit, vaccination status, and the need for social services and occupational therapy.[26,29]	5b	A
	30. Annual low-dose CT scans are recommended for patients with a smoking history to screen for lung cancer.[29]	5b	A

(*Continued*)

Table 5 (Continued).

Primary Headings	Literature Content/Theme	Level of Evidence	Recommended Level
Assessment of health education outcomes	31. It is recommended to use validated tools (such as the Bristol COPD Knowledge Questionnaire (BCKQ), Lung Information Needs Questionnaire (LINQ), etc). to measure patients' knowledge, self-efficacy, and behavior change before and after rehabilitation to assess the effectiveness of the educational component and facilitate continuous improvement.[18]	Ib	A

patient clinical outcomes. Muijsenberg et al[37] clearly pointed out that traditional didactic education struggles to meet patients' real needs, providing a strong rationale for shifting health education toward personalized and multimodal approaches. Furthermore, approximately 40–80% of medical information is forgotten by patients immediately after consultation; during a 5-minute routine education session, the effective information retention rate is only 20%, and nearly half of that is misunderstood.[38] This phenomenon is known as the "knowledge transmission inverted triangle," where information continuously attenuates as it is transferred from healthcare providers to patients, highlighting the fundamental limitation of traditional one-way educational models.

Therefore, based on patient empowerment theory, the core goal of health education should not remain at the level of knowledge transmission but should shift toward promoting patient behavioral change and ultimately enhancing patients' self-management abilities. The teach-back method has been confirmed by multiple studies to be an effective two-way interactive strategy.[39–41] Notably, although the teach-back method does not appear as an independent item in the evidence presented in this study (Table 3), its concept is highly consistent with Evidence item 5 (Table 5) and can serve as an important supplement for clinical translation. Its core advantage lies in transforming one-way information delivery into a two-way interactive cycle of "explain - repeat - correct" between healthcare providers and patients, ensuring that patients truly understand and master the information. This method not only effectively identifies and corrects patient misunderstandings, reducing the risk of medication errors or disease deterioration caused by incorrect understanding, but also enhances patient engagement and adherence to treatment. Simultaneously, it provides healthcare professionals with immediate feedback to evaluate educational effectiveness. Theoretically, the effectiveness of the teach-back method can be supported by the Knowledge-Attitude-Practice (KAP) model and the Health Belief Model (HBM). The KAP model points out that knowledge is the foundation of behavioral change, attitude is the driving force, and behavior is the ultimate goal. By repeatedly verifying patients' understanding of information, the teach-back method ensures the accuracy of knowledge acquisition, lays the premise for forming correct attitudes, and ultimately promotes stable behavioral establishment. The HBM emphasizes that whether an individual adopts a health behavior depends on their perception of disease threat, recognition of behavioral benefits, and level of self-efficacy. During the "repeat-correct" process, the teach-back method helps patients clearly understand the specific risks of non-adherent behavior, reinforces the benefits of correct performance, and builds the confidence of "I can do it" through repeated successful repetition, thereby effectively translating health beliefs into daily health actions.

With "Internet + Healthcare" becoming a hot topic in research and practice, inefficient educational models are undergoing profound transformations.[42] The teach-back method focuses on interaction quality, while digital technology focuses on resource accessibility, and the two can complement one another. Increasingly, researchers are leveraging remote platforms to deliver online education to patients, driving health education toward digitalization, personalization, and systematization.[43,44] Many platforms have achieved Internet interoperability, supporting patients in autonomously retrieving customized health knowledge.[45] These technologies not only expand the accessibility of educational resources but also empower patients with greater confidence to actively participate in health management processes.

Multidisciplinary Collaboration is the Structural Prerequisite for Achieving Personalized Education

Given that COPD is a chronic disease with multiple comorbidities, patients often suffer from various physical and psychological complications, such as cardiovascular disease, diabetes, osteoporosis, anxiety, and depression. This pathological characteristic determines that the self-management skills that patients need to master are not limited to respiratory rehabilitation or medication adherence but rather span a complex knowledge system across multiple domains, including respiratory, cardiovascular, metabolic, musculoskeletal, and psychological health. This inherent complexity requires a multidisciplinary team (MDT) to provide leadership and support for individualized education.[46,47]

As Anne stated,[48] MDT is not simply a collection of individuals but a collaborative network that organically integrates the roles of physicians, respiratory nurses, physiotherapists, dietitians, psychological counselors, and pharmacists. However, multiple studies have consistently indicated that the clinical implementation rate of MDT is far lower than expected.[49] Even in the context of strong guideline recommendations for MDT effectiveness,[30] real-world data remain discouraging. Henoch et al,[50] based on data from 7,810 patients with COPD in the Swedish National Airway Registry, found that less than 20% of patients had ever been in contact with a physiotherapist or dietitian. This means that although guidelines advocate for multidimensional, interdisciplinary comprehensive care, the vast majority of patients with COPD do not receive these core support services during routine clinical visits.

The reasons for this are as follows: First, there is a shortage of interdisciplinary staff. Effective MDT operation for COPD requires the joint participation of respiratory physicians, nurses, physiotherapists, pharmacists, and other professionals. Such professionals are severely lacking in most healthcare institutions, even in developed countries (eg, Ireland), and especially in low- and middle-income countries. Lim et al[51] conducted a cross-sectional survey of consultant respiratory physicians in the Republic of Ireland and found that only 31% of respondents reported having a dedicated COPD multidisciplinary team in their institution, and approximately 30% felt that adequate pulmonary rehabilitation resources were unavailable. Moreover, up to 71.4% of nurses reported a lack of specialized health-education training.[52] Nurses are the main executors of education, and their insufficient knowledge base and lack of training opportunities are the deeper reasons why MDT implementation is difficult.

Therefore, we strongly recommend: (1) Strengthen the core staffing of MDT. Each tertiary hospital respiratory department should be equipped with at least one respiratory nurse, one physiotherapist, and one pharmacist as permanent core members of the MDT. For institutions with staffing shortages, assistance should be provided to lower-level hospitals through tertiary hospital Internet platforms. Simultaneously, systematically trained respiratory nurses should be allowed to take on multiple expanded roles (eg, basic pulmonary rehabilitation guidance, rapid nutritional risk assessment, and psychological support) so that limited staffing can cover the core functions of the MDT. (2) Improving the education and certification systems for respiratory nurses. Pre-service and in-service education for all respiratory nurses should adopt a model combining simulated cases and standardized patients, and MDT qualification should be certified through objective structured clinical examinations (OSCEs). Healthcare institutions should make passing this certification a mandatory requirement for nurses responsible for COPD patient follow-up, and regular re-evaluations should be conducted.

Limitations

This study has the following limitations: (1) the literature search was limited to Chinese and English databases, which may introduce language bias; (2) some of the included literature was not specifically focused on COPD health education, so its applicability may be limited; and (3) the existing evidence originates from studies conducted in multiple countries, with insufficient consideration given to specific cultural backgrounds, health literacy levels, and social support systems. Therefore, when health education programs are applied in local contexts, adaptive adjustments and innovations are needed; (4) the researchers performed the extraction, grading, and synthesis of evidence. Although we used independent assessments by two reviewers and Kappa consistency tests, some subjective judgments may still exist, potentially affecting the robustness of the evidence synthesis.

Conclusion

This study systematically retrieved and synthesized 31 evidence items on health education in COPD, covering seven themes: educational principles, providers, recipients, methods, objectives, core content, and outcome assessment. The evidence indicates that effective health education should shift from traditional one-way knowledge transmission to an interactive model centered on patient empowerment. Educational content should be tailored based on regional resources, cultural backgrounds, and patients' health literacy levels, and a closed loop of "education – assessment – feedback" should be established to continuously optimize outcomes. Relying on multidisciplinary teams and intelligent technologies, health education can achieve systematic, personalized, and interactive delivery. Future research should focus on the development and validation of localized education programs in low-resource settings, implementation strategies for multidisciplinary team collaboration, and long-term intervention outcome evaluations supported by digital technologies.

Data Sharing Statement

The datasets supporting the conclusions of this article are included within the article and its additional file.

Ethics Statement

This systematic review did not involve direct patient contact or primary data collection. All included studies had obtained appropriate ethical approval and informed consent as reported in their original publications. No further ethical approval or informed consent was required for this review.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

1. Boers E, Barrett M, Su JG, et al. Global burden of chronic obstructive pulmonary disease through 2050. *JAMA Network Open*. 2023;6(12):e2346598. doi:10.1001/jamanetworkopen.2023.46598
2. Muijsenberg AJL, Houben-Wilke S, Spruit MA, Janssen DJA. Education for people with serious chronic respiratory diseases and their informal caregivers: how to address challenges that impact learning. *Curr Opin Support Palliat Care*. 2024;18(4):206–212. doi:10.1097/SPC.0000000000000719
3. Ho CC, Chan CWH, Li C, Xiao J, Ng MS. Literature review and development of pictorial action plan to promote self-management of chronic obstructive pulmonary disease. *Patient Educ Couns*. 2023;115:107923. doi:10.1016/j.pec.2023.107923
4. Schrijver J, Lenferink A, Brusse-Keizer M, et al. Self-management interventions for people with chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2022;1(1):CD002990. doi:10.1002/14651858.CD002990.pub4
5. Wang T, Tan JY, Xiao LD, Deng R. Effectiveness of disease-specific self-management education on health outcomes in patients with chronic obstructive pulmonary disease: an updated systematic review and meta-analysis. *Patient Educ Couns*. 2017;100(8):1432–1446. doi:10.1016/j.pec.2017.02.026
6. Ammous O, Kampo R, Wollsching-Strobel M, et al. Adherence-enhancing interventions for pharmacological and oxygen therapy in patients with COPD: a systematic review and component network meta-analyses. *Eur Respir Rev*. 2024;33(173):240011. doi:10.1183/16000617.0011-2024
7. Nici L, Donner C, Wouters E, et al. American Thoracic Society/European Respiratory Society statement on pulmonary rehabilitation. *Am J Respir Crit Care Med*. 2006;173(12):1390–1413. doi:10.1164/rccm.200508-1211ST

8. Spruit MA, Singh SJ, Garvey C, et al. An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation. *Am J Respir Crit Care Med*. 2013;188(8):e13–e64. doi:10.1164/rccm.201309-1634ST
9. Mendes MA, Rodrigues G, Janssen DJA, Spruit MA, Marques A. Understanding the determinants and outcomes of education in pulmonary rehabilitation: moving toward person-centered care. *Chest*. 2025;167(6):1615–1627. doi:10.1016/j.chest.2025.01.005
10. Heijmans M, Poortvliet R, Van der Gaag M, et al. Using a taxonomy to systematically identify and describe self-management interventions components in randomized trials for COPD. *Int J Environ Res Public Health*. 2022;19(19):12685. doi:10.3390/ijerph191912685
11. Aung H, Tan R, Flynn C, et al. Digital remote maintenance inhaler adherence interventions in COPD: a systematic review and meta-analysis. *Eur Respir Rev*. 2024;33(174):240136. doi:10.1183/16000617.0136-2024
12. Song J, Wang Q, Zhao C, Wang L, Li L, Kang D. Comparative efficacy of pulmonary rehabilitation delivery models on dyspnoea, exercise capacity and health-related quality of life in chronic respiratory disease: a systematic review and network meta-analysis. *NPJ Prim Care Respir Med*. 2025;36(1):8. doi:10.1038/s41533-025-00472-4
13. Siu DCH, Gafni-Lachter L. Addressing Barriers to Chronic Obstructive Pulmonary Disease (COPD) care: three innovative evidence-based approaches: a review. *Int J Chron Obstruct Pulmon Dis*. 2024;19:331–341. doi:10.2147/COPD.S426050
14. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977;33(1):159–174. doi:10.2307/2529310
15. Pearson A, Wiechula R, Court A, Lockwood C. The JBI model of evidence-based healthcare. *Int J Evid Based Healthc*. 2005;3(8):207–215. doi:10.1111/j.1479-6988.2005.00026.x
16. Smith R, Osadnik CR, Lee AL. Educational topics and their rationale for inclusion within pulmonary rehabilitation - a systematic review. *Patient Educ Couns*. 2020;103(10):1997–2008. doi:10.1016/j.pec.2020.04.009
17. Stoilkova A, Janssen DJ, Wouters EF. Educational programmes in COPD management interventions: a systematic review. *Respir Med*. 2013;107 (11):1637–1650. doi:10.1016/j.rmed.2013.08.006
18. Roberts NJ, Kidd L, Kirkwood K, Cross J, Partridge MR. A systematic review of the content and delivery of education in pulmonary rehabilitation programmes. *Respir Med*. 2018;145:161–181. doi:10.1016/j.rmed.2018.11.002
19. Xu B, Wei QG, Chen SF, et al. Systematic evaluation of the efficacy of health education based on “Internet Plus” on stable phase of chronic obstructive pulmonary disease. *China Med Pharm*. 2023;13(4):47–51.
20. Maricoto T, Monteiro L, Gama JMR, Correia-de-Sousa J, Taborda-Barata L. Inhaler technique education and exacerbation risk in older adults with asthma or chronic obstructive pulmonary disease: a meta-analysis. *J Am Geriatr Soc*. 2019;67(1):57–66. doi:10.1111/jgs.15602
21. Liu XL, Tan JY, Liu F, Zhang M, Yao LQ . Meta-analysis of the impact of self-management education on the health of patients with chronic obstructive pulmonary disease. *Chin J Nurs*. 2013;48(3):263–266.
22. Criner GJ, Bourbeau J, Diekemper RL, et al. Prevention of acute exacerbations of COPD: American College of Chest Physicians and Canadian Thoracic Society Guideline. *Chest*. 2015;147(4):894–942. doi:10.1378/chest.14-1676
23. Chen X, Gong D, Huang H, Wang K, Zhang W, Li S. Expert consensus and operational guidelines on exercise rehabilitation of chronic obstructive pulmonary disease with integrating traditional Chinese medicine and Western medicine. *J Thorac Dis*. 2021;13(6):3323–3346. doi:10.21037/jtd-21-431
24. Chinese Thoracic Society; Respiratory Disease Prevention and Control Specialty Societies of Chinese Preventive Medicine Association. Chronic Obstructive Pulmonary Disease Committee of Chinese Association of Chest Physician; County Respiratory Professional Committee of China Association of Health Promotion and Education. [Peri-discharge management and follow-up of acute exacerbations of COPD]. *Zhonghua Jie He He Hu Xi Za Zhi*. 2024;47(11):1048–1068. doi:10.3760/cma.j.cn112147-20240816-00488.
25. Chinese Society of Gerontology and Geriatrics. Guidelines for the management of chronic obstructive pulmonary disease in the elderly. *J Integr Tradit Chin West Med Res*. 2023;15(3):154–164.
26. Chinese Medical Association, et al. Guidelines for the primary care diagnosis and management of chronic obstructive pulmonary disease in China (2024). *Chin J Gen Pract*. 2024;23(6):578–602.
27. National Institute for Health and Care Excellence. *Chronic Obstructive Pulmonary Disease in Over 16s: Diagnosis and Management*. NICE guideline NG115. London: NICE;2019.
28. Chronic Obstructive Pulmonary Disease Group of Chinese Thoracic Society, et al. Guidelines for the diagnosis and treatment of chronic obstructive pulmonary disease (2021 revised edition). *Chin J Tuberc Respir Dis*. 2021;44(3):170–205.
29. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: 2026 report. 2026.
30. Yang IA, George J, McDonald CF, et al. The COPD-X plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease 2025. version 2.78. 2025. Available from: https://copdx.org.au/copd-x-plan/. Accessed December 18, 2025.
31. Wu XD, Chen X, Li SQ, Zhang W, Wu QH . Expert consensus on the application of traditional Chinese medicine in exercise rehabilitation for chronic obstructive pulmonary disease. *World Clin Drugs*. 2022;43(3):211–221.
32. Chronic Obstructive Pulmonary Disease Group of Chinese Thoracic Society, et al. Chinese expert consensus on the identification and management of patients at high risk for acute exacerbation of chronic obstructive pulmonary disease. *Int J Respir*. 2022;42(24):1845–1863.
33. Salvi S, Ghorpade D, Nair S, et al. A 7-point evidence-based care discharge protocol for patients hospitalized for exacerbation of COPD: consensus strategy and expert recommendation. *NPJ Prim Care Respir Med*. 2024;34(1):44. doi:10.1038/s41533-024-00378-7
34. Chen X, Jia J, Ding YP, et al. Respiratory and rehabilitation expert consensus on full-cycle rehabilitation assessment and treatment for elderly patients with chronic obstructive pulmonary disease. *Rehabil Med*. 2024;34(6):544–555. doi:10.3724/SP.J.1329.2024.06003
35. Elnasieh AM, Alturki AT, Alhadlaq R, et al. Health education resources favored by out-patients attending King Saud Medical City, Riyadh. *Cureus*. 2024;16(8):e67089. doi:10.7759/cureus.67089
36. Giguère A, Légaré F, Grimshaw J, et al. Printed educational materials: effects on professional practice and healthcare outcomes. *Cochrane Database Syst Rev*. 2012;10(10):CD004398. doi:10.1002/14651858.CD004398.pub3
37. Muijsenberg AJ, Houben-Wilke S, Tatousek J, Lacroix J, Spruit MA, Janssen DJ. Educational needs of people with COPD or asthma entering pulmonary rehabilitation and their significant others: a cross-sectional study. *Chron Respir Dis*. 2025;22:14799731251316891. doi:10.1177/14799731251316891
38. Geleta TA, Deriba BS. Exploring enablers and barriers to utilize printed information, education, and communication materials among healthcare providers of North Shoa Zone, Oromia, Ethiopia. *Risk Manag Healthc Policy*. 2022;15:1303–1313. doi:10.2147/RMHP.S360417

39. Hasanpour Dehkordi A, Ebrahimi-Dehkordi S, Banitalebi-Dehkordi F, Salehi Tali S, Kheiri S, Soleimani Babadi A. The effect of teach-back training intervention of breathing exercise on the level of dyspnea, six-minutes walking test and FEV1/FVC ratio in patients with chronic obstructive pulmonary disease; a randomized controlled trial. *Expert Rev Respir Med*. 2021;15(1):161–169. doi:10.1080/17476348.2020.1822740
40. Ji Q, Han M, Xu K, Liu T, Yang J, Wang T. Research on the application of feedback method combined with diversified health education in elderly patients with COPD complicated with dysphagia. *Sci Rep*. 2025;16(1):3658. doi:10.1038/s41598-025-33757-2
41. Vázquez-González N, Leiva-Fernández J, Cotta-Luque VM, et al. Effectiveness of an educational intervention about inhalation technique in healthcare professionals in primary care: a cluster randomized trial. *Front Pharmacol*. 2023;14:1266095. doi:10.3389/fphar.2023.1266095
42. Yang K, Hu Y, Qi H. Digital health literacy: bibliometric analysis. *J Med Internet Res*. 2022;24(7):e35816. doi:10.2196/35816
43. Sun C, Dai H, Van der Kleij MJJR, et al. Digital health education for chronic lung disease: scoping review. *J Med Internet Res*. 2025;27:e53142. doi:10.2196/53142
44. Sarker MHR, Moriyama M, Rashid HU, et al. Chronic kidney disease awareness campaign and mobile health education to improve knowledge, quality of life, and motivation for a healthy lifestyle among patients with chronic kidney disease in Bangladesh: randomized controlled trial. *J Med Internet Res*. 2022;24(8):e37314. doi:10.2196/37314
45. Zhao L, Liu Y, Li J, Li P, Zhao X, Zhang S. Effects of internet-based health education on patients with acute intermittent porphyria. *Orphanet J Rare Dis*. 2024;19(1):428. doi:10.1186/s13023-024-03440-2
46. Shi Y, Li H, Yuan B, Wang X. Effects of multidisciplinary teamwork in non-hospital settings on healthcare and patients with chronic conditions: a systematic review and meta-analysis. *BMC Prim Care*. 2025;26(1):110. doi:10.1186/s12875-025-02814-0
47. Miguel-Díez JD, Fernández-Villar A, Doña Díaz E, et al. Chronic obstructive lung disease: treatment guidelines and recommendations for referral and multidisciplinary continuity of care. *J Clin Med*. 2024;13(2):303. doi:10.3390/jcm13020303
48. Kuzma AM, Meli Y, Meldrum C, et al. Multidisciplinary care of the patient with chronic obstructive pulmonary disease. *Proc Am Thorac Soc*. 2008;5(4):567–571. doi:10.1513/pats.200708-125ET
49. Houben-Wilke S, Vaes AW, Cuijpers M, et al. An overview of the importance of allied healthcare for patients with COPD. *Expert Rev Respir Med*. 2026. doi:10.1080/17476348.2026.2629007
50. Henoch I, Strang S, Löfdahl CG, Ekberg-Jansson A. Management of COPD, equal treatment across age, gender, and social situation? A register study. *Int J Chron Obstruct Pulmon Dis*. 2016;11:2681–2690. doi:10.2147/COPD.S115238
51. Lim J, O'Brien H, McCarthy J, McCarthy C, Franciosi AN. Current practices, perceptions and future challenges in the management of moderate to severe COPD: a cross-sectional survey of respiratory consultants in the Republic of Ireland. *BMJ Open Respir Res*. 2025;12(1):e003520. doi:10.1136/bmjresp-2025-003520
52. Pueyo-Garrigues M, Pardavila-Belio MI, Canga-Armayor A, Esandi N, Alfaro-Díaz C, Canga-Armayor N. NURSES' knowledge, skills and personal attributes for providing competent health education practice, and its influencing factors: a cross-sectional study. *Nurse Educ Pract*. 2022;58:103277. doi:10.1016/j.nepr.2021.103277