Postprint of a Closed-Loop Management Case Study Based on a COPD Prevention and Treatment Platform

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Abstract

This article explores how general practitioners can leverage their unique advantages, integrate various resources, and through questionnaire surveys, pulmonary function testing, and comprehensive assessment, formulate individualized treatment plans to achieve early identification, accurate diagnosis, effective intervention, and comprehensive care for chronic obstructive pulmonary disease (COPD), by presenting the screening-diagnosis-treatment-management process of a COPD patient under the primary care "COPD Prevention and Treatment Platform" management model. It provides innovative concepts and practical pathways for primary care management of COPD, thereby effectively enhancing primary care capacity for COPD prevention and treatment.

Full Text

Preamble

Case Sharing of Closed-Loop Management Based on the Prevention and Treatment Platform for Chronic Obstructive Pulmonary Disease

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Abstract This article presents a case study of the "screen-diagnose-treat-manage" process for a chronic obstructive pulmonary disease (COPD) patient under a community-based COPD prevention and treatment platform. It

explores how general practitioners can leverage their unique advantages to integrate various resources, develop individualized treatment plans based on questionnaire surveys, pulmonary function tests, and comprehensive assessments, and achieve early identification, accurate diagnosis, effective intervention, and comprehensive care for COPD. This approach provides innovative ideas and practical pathways for primary-level COPD management, thereby effectively enhancing primary care capacity for COPD prevention and treatment.

[**Key words**] Pulmonary disease, chronic obstructive; Lung health home; Family doctor model; Community prevention and control

Chronic obstructive pulmonary disease (COPD) is a common chronic respiratory disease with high global morbidity and mortality. COPD has an insidious onset, and most patients first seek care at primary care facilities, yet 70% of COPD patients remain underdiagnosed. Many patients are only identified when their condition has become relatively severe. Therefore, early identification of COPD patients in the population while considering cost-effectiveness, coupled with implementation of personalized comprehensive treatment and management strategies, has become critical for improving primary-level COPD prevention and treatment capabilities. This article aims to explore how the community-based COPD prevention and treatment platform facilitates early detection and personalized comprehensive management by presenting a case study of a COPD patient's closed-loop "screen-diagnose-treat-manage" process.

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The "Pulmonary Rehabilitation Club" COPD Prevention and Treatment Platform

By establishing a "Pulmonary Rehabilitation Club" COPD prevention and treatment platform at the community level, we utilize hospitals, community health service centers (stations), clinics, and retail pharmacies within the platform as frontline sentinel points. Medical staff at these facilities identify high-risk individuals seeking medical care or purchasing medications. According to China's "Guidelines for Primary Care Diagnosis and Treatment of Chronic Obstructive Pulmonary Disease (2024 Edition)," individuals meeting any one or more characteristics in Table 1 are defined as high-risk populations for COPD. These

individuals are administered the Chronic Obstructive Pulmonary Disease Self-Screening Questionnaire (COPD-SQ). Those scoring $ $16 points are considered positive and defined as suspected COPD patients. With informed consent, positive questionnaire results are reported to the platform grid administrator, who assists patients in undergoing further pulmonary function testing.

Table 1 Risk Factors for Chronic Obstructive Pulmonary Disease

Personal Factors 1. Age $\geq$ 40 years 2. History of certain specific diseases such as bronchial asthma, allergic rhinitis, chronic bronchitis, emphysema, etc. 3. Vitamin A deficiency or fetal lung dysplasia

Environmental Factors 1. Smoking or long-term exposure to secondhand smoke 2. Residence in areas with severe air pollution, especially regions polluted by sulfur dioxide and other harmful gases 3. Repeated lower respiratory tract infections during infancy and early childhood

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Case Presentation

An elderly patient with recurrent cough and sputum production for over 10 years purchased medication at a social pharmacy within the COPD prevention and treatment platform. After preliminary assessment, the pharmacist identified him as a high-risk individual for COPD. Following pharmaceutical care, the patient completed the COPD-SQ questionnaire, scoring 17 points. The pharmacist subsequently reported the patient as a "suspected COPD case" to the platform. The grid administrator provided COPD education via telephone and recommended that he visit the community health service center for further evaluation.

For COPD diagnosis, a comprehensive approach integrating medical history, clinical symptoms, and pulmonary function testing is essential. Pulmonary function tests are performed by specially trained and qualified professionals. For examinees with forced expiratory volume in one second (FEV1)/forced vital capacity (FVC) $<$ 70%, a bronchodilator test is conducted by administering 200–400 g of salbutamol aerosol; if FEV1/FVC remains below 70% after 15–20 minutes, COPD is provisionally diagnosed. Patients with questionable diagnoses are referred to respiratory outpatient clinics at secondary or regional tertiary general hospitals for further evaluation.

The patient is a 65-year-old male who developed recurrent cough and sputum production over ten years ago, most prominent in the morning, with white mucoid sputum that was thick and difficult to expectorate. Symptoms were more pronounced in autumn and winter, occurring for more than three months annually, with progressive worsening over the years without standardized treatment. Three years ago, he gradually developed dyspnea on exertion, typically when climbing three flights of stairs, walking up a 200-meter slope, or brisk walking 400–500 meters, which resolved with rest. During severe episodes of cough

and dyspnea, he self-medicated with cough suppressants (specifics unknown) purchased from pharmacies or received intravenous therapy (aminophylline, cephalosporins, dexamethasone, etc.) at private clinics, which provided relief, occurring at least twice annually. One week prior, he purchased medication at a social pharmacy due to persistent cough and sputum symptoms. Pharmacy staff reported him as a suspected COPD case to the platform, and he now presents for further evaluation following notification from community health service center staff. He hopes to rule out lung cancer, control his disease, and improve exercise tolerance.

Over the past month, his symptoms have remained similar without significant worsening. He denies fever, night sweats, fatigue, chest pain, hemoptysis, or acid reflux with heartburn. Sleep quality is poor, diet is salty, bowel and bladder functions are normal, and weight is stable. Past medical history is negative for hypertension, diabetes, coronary heart disease, allergic rhinitis, or asthma. He denies dust exposure, surgical history, or food and drug allergies.

Personal and marital history reveals 40 years of tobacco and alcohol use: 20 cigarettes daily with a failed quit attempt three years ago, and 250 g of liquor daily. He prefers salty foods, exercises occasionally, has stable financial status, harmonious family relationships with good family resource utilization, enjoys playing mahjong, and has moderate medical compliance. He has two daughters and one son, all in good health. Family history is notable for a father with "chronic cough."

Physical examination shows temperature 36.8°C, pulse 94 beats/min, respiratory rate 21 breaths/min, blood pressure 134/62 mmHg (1 mmHg = 0.133 kPa), oxygen saturation 96%, height 170 cm, weight 75 kg, BMI 26 kg/m^2, and waist circumference 96 cm. The patient is alert, with a chronic illness appearance, slight cyanosis of the lips, and stable breathing. No jugular venous distention is observed. Chest examination reveals barrel chest, widened intercostal spaces, hyperresonant percussion bilaterally, diminished breath sounds, scattered expiratory wheezes, and prolonged expiration. Heart rate is 94 beats/min with regular rhythm, P2 < A2, and no pathological murmurs. The abdomen is protuberant but soft, without tenderness or rebound tenderness. Liver and spleen are not palpable below the costal margin. No lower extremity edema or clubbing is present.

Laboratory findings: White blood cell count 6.50×10^9/L, red blood cell count 5.54×10^{12}/L, hemoglobin 158 g/L, neutrophils 3.71×10^9/L, eosinophils 0.32×10^9/L, C-reactive protein 0.82 mg/L; fasting glucose 6.63 mmol/L, total cholesterol 5.61 mmol/L, triglycerides 2.75 mmol/L, high-density lipoprotein cholesterol 0.99 mmol/L, low-density lipoprotein cholesterol 3.48 mmol/L. Urinalysis and liver and kidney functions show no significant abnormalities.

Electrocardiogram shows no P pulmonale or complete right bundle branch block. Abdominal ultrasound reveals mild fatty liver. Echocardiography shows no significant atrial or ventricular enlargement, no pulmonary hypertension signs,

decreased left ventricular compliance, and no pathological valvular regurgitation. Chest CT shows emphysematous changes and multiple lesions in the right lower lobe.

Pulmonary function tests: Forced vital capacity (FVC) actual value 2.72 L, predicted value 3.84 L, 71.0% of predicted; FEV1 actual value 1.81 L, predicted value 3.03 L, 59.7% of predicted; FEV1/FVC ratio 66.5%. Bronchodilator test is positive (FEV1 pre-bronchodilator 1.51 L, post-bronchodilator 1.81 L after 400 g salbutamol, representing a 20% increase in predicted FEV1 and absolute increase of 300 mL). Modified Medical Research Council (mMRC) dyspnea score: 2 points; COPD Assessment Test (CAT) score: 21 points.

Diagnostic Assessment and Management Approach

Case Characteristics: This elderly male patient has a long smoking history with a chronic progressive course characterized by recurrent cough, sputum production, and exertional dyspnea, currently stable without acute exacerbation or obvious heart failure manifestations. Physical examination findings of barrel chest, widened intercostal spaces, hyperresonant percussion, diminished breath sounds, scattered expiratory wheezes, prolonged expiration, and P2 < A2 are consistent with COPD. Pulmonary function tests indicate moderate obstructive ventilatory dysfunction with a positive bronchodilator test. Chest CT shows emphysematous changes, elevated eosinophil count, and family history of chronic cough, suggesting features of bronchial asthma. mMRC score is 2 points and CAT score is 21 points.

Problem List: 1. COPD with comorbid bronchial asthma (stable phase, GOLD Grade 2, Group E) 2. Overweight with central obesity (BMI 26.0 kg/m^2, waist circumference 96 cm) 3. Mild fatty liver 4. Prediabetes (blood glucose 6.63 mmol/L) 5. Dyslipidemia (TC 5.61 mmol/L; LDL-C 3.48 mmol/L; HDL-C 0.99 mmol/L) 6. Smoking 7. Physical inactivity 8. History of recurrent infections 9. Moderate 10-year risk for atherosclerotic cardiovascular disease (ASCVD)

Differential Diagnosis: This patient has no cardiac history, no massive purulent sputum or hemoptysis, and chest CT shows no cardiomegaly, pulmonary edema, bronchiectasis, infiltrates, nodules, or cavitary lesions, effectively ruling out congestive heart failure, bronchiectasis, and pulmonary tuberculosis.

Management Strategy: When managing COPD with comorbid asthma, it is essential to thoroughly analyze the interplay of pathophysiological mechanisms, compare clinical manifestations, and design personalized treatment plans based on individual patient characteristics. For COPD patients with complex multimorbidity or acute exacerbations, prompt referral to higher-level medical institutions is necessary for more detailed diagnosis and precise treatment strategies. This patient is in a stable disease phase without hypoxemia but has high-risk factors including glucose-lipid metabolism disorders, persistent smoking,

and physical inactivity. Therefore, strengthening patient education to deepen disease understanding is crucial to motivate active lifestyle changes including smoking cessation, dietary modification, and exercise enhancement alongside pharmacotherapy, fostering a collaborative patient-physician relationship that promotes health.

Treatment Implementation

3.1 Collaborative Treatment Planning

The patient's concerns, ideas, and expectations were clarified. Family function and financial status are good, though medical compliance needs improvement.

(1) Pharmacotherapy: Budesonide/glycopyrrolate/formoterol fumarate inhalation aerosol, oral inhalation, twice daily.

(2) Non-pharmacological Interventions: - **Smoking Cessation:** After emphasizing that smoking cessation is the most effective measure influencing disease progression, the patient expressed willingness to quit. The "5A" approach was applied: Ask (document smoking status), Advise (explain tobacco harms), Assess (evaluate readiness and develop quit plan), Assist (provide practical techniques such as deep breathing, relaxation training, and distraction to manage anxiety and discomfort), and Arrange (follow up on progress, provide support to overcome challenges, and encourage persistence). Family supervision was arranged. - **Pulmonary Rehabilitation:** Guidance included pursed-lip breathing to prevent premature small airway collapse, diaphragmatic breathing to strengthen abdominal muscle movement, improve ventilation, reduce oxygen consumption, and enhance exercise tolerance. Respiratory training was prescribed 2–3 times daily for 10–20 minutes each session. - **Exercise Training:** Based on personal interests, whole-body exercise options included brisk walking, cycling, tai chi, and stair climbing with gradually increasing intensity tailored to tolerance. - **Traditional Chinese Medicine Intervention:** Traditional Chinese medicine constitution identification revealed phlegm-dampness constitution. Treatment focused on supplementing qi, strengthening the spleen, and eliminating phlegm-dampness. The patient selected herbal tea (every other day): Astragalus 10 g, dried tangerine peel 3 g, charred hawthorn 6 g, lotus leaf 3 g, and ginger 3 slices. Acupoint embedding therapy (alternating points every 2 weeks) included bilateral Fengmen, Feishu, Xinshu, Gaohuang, Pishu, Sanjiaoshu, Danzhong, Zhongwan, Qihai, Zusanli, and Fenglong. Sanfu patch therapy was added during the dog days of summer. - **Lifestyle Guidance:** The patient was informed that alcohol consumption may worsen dyspnea, affect medication efficacy, and increase infection risk, with recommendations to minimize or abstain except for limited quantities on special occasions. High-salt and pickled foods should be reduced. Lean meat, skinless poultry, fish, and low-fat dairy products are preferred, with steaming, boiling, or baking as optimal cooking methods. Sugar-sweetened beverages, candy, and desserts should

be limited while increasing whole grains, fruits, and vegetables. Adequate high-quality protein from fish, poultry, eggs, soy products, and dairy helps maintain muscle strength and immunity. Regular sleep schedules and adequate rest are essential, along with emotional management and participation in social activities to relieve stress. Hobbies such as gardening, reading, listening to music, handicrafts, or light housework can enhance life satisfaction. - **Vaccination:** Recommendations include one dose of shingles vaccine, annual influenza vaccine, and pneumococcal vaccine every 5 years. - **Weight Management:** Approaches include total calorie control, dietary optimization, and reasonable exercise. Current weight is 75.0 kg, with short-term goal of 72.5 kg and long-term goal of 69 kg. The patient was advised to avoid excessive dieting that could cause malnutrition and affect respiratory function.

(3) Follow-up Plan: Follow-up at 2 weeks to assess inhaler technique and smoking status; regular monitoring of blood glucose, lipids, and pulmonary function. The patient and family were instructed to contact the physician immediately if dyspnea or symptoms worsen.

(4) Patient Education: Education sessions were conducted to increase disease awareness, improve understanding of etiological prevention, enhance self-protection, and improve compliance.

(5) Timely Referral: When necessary, referral to higher-level facilities was arranged.

Platform Integration and Follow-up Outcomes

After obtaining consent, the patient was enrolled in the "Pulmonary Rehabilitation Club" prevention and treatment platform. The platform integrates resources to establish a family-community linkage, higher-level hospital-primary care hospital interaction, and general practitioner-specialist combined medical-preventive fusion model, leveraging information advantages to weave a community COPD management network. Online and offline services provide convenient, efficient, and timely care: the WeChat platform distributes health information and offers online consultation, while offline services include outpatient care, club-style exchanges, health lectures, and rehabilitation training to promote practical and engaging patient-physician and patient-patient interactions.

At the 2-week follow-up visit at the community health service center: 1. **Smoking Status:** The patient and family reported significantly reduced smoking (1 pack every 2–3 days). 2. **Clinical Symptoms:** Cough and sputum production markedly improved, exercise tolerance increased, and oxygen saturation reached 98%. 3. **Weight:** No significant change yet, but active efforts in diet and exercise were underway. 4. **Medication Use:** Issues identified included insufficient exhalation before inhalation, inadequate breath-holding time leading to insufficient drug delivery, inadequate mouth rinsing after inhalation, need

for further hand-breath coordination training, and irregular medication use. Correct inhalation technique was re-demonstrated, emphasizing the importance of post-inhalation rinsing to prevent hoarseness and oropharyngeal fungal infection, which the patient understood and accepted. Respiratory training was reinforced, with instructions for follow-up reassessment in 3 months.

During the 1-year management period in the "Pulmonary Rehabilitation Club" platform, the patient actively participated in activities, continuously improving self-management skills. With mutual supervision and encouragement from family and club members, he successfully quit smoking. Under the guidance of the family doctor team, he received professional pulmonary rehabilitation instruction, learned and mastered tai chi, Baduanjin, and breathing exercises. After systematic training, symptoms markedly improved, exercise tolerance and quality of life significantly enhanced, and he frequently organized short trips with elderly friends and fellow patients. No acute exacerbations occurred during treatment, pulmonary function monitoring showed no decline, and blood glucose, lipids, weight, and waist circumference showed positive improvements (Table 2).

Table 2 Comparison of Indicators Before and After Inclusion in the COPD Prevention and Treatment Platform

Indicator	Before Platform Inclusion	1 Year After Platform Inclusion
mMRC score	2 points (walks slower than peers on level ground)	1 point (dyspnea when hurrying or climbing hills)
CAT score	21 points (severely impacts daily life)	16 points (maintains relatively normal daily life)
FEV1/FVC	66.5%	67.1%
FEV1/pre	59.7%	58.9%
Smoking	20 cigarettes/day	1 pack/2–3 days
Patient-reported symptoms	Thick, difficult-to-expectorate sputum, poor exercise tolerance	Overall significant improvement

Note: mMRC = Modified Medical Research Council Dyspnea Scale; CAT = COPD Assessment Test; FEV1/FVC = Forced Expiratory Volume in 1 second/Forced Vital Capacity ratio; FEV1/pre = Forced Expiratory Volume in 1 second as percentage of predicted value.

These positive outcomes enhanced patient compliance, creating a virtuous cycle that strengthened treatment confidence and improved therapeutic efficacy.

Discussion

Accurate COPD diagnosis requires strict adherence to diagnostic criteria and processes using a general practice approach for comprehensive assessment. The clinical symptoms and signs of COPD, chronic bronchitis, and bronchial asthma are similar and often overlap, creating diagnostic challenges. However, through detailed history taking, physical examination, pulmonary function testing, imaging studies, and laboratory tests, these conditions can be effectively differentiated. For difficult cases, consultation with specialists or referral to higher-level hospitals is warranted. The "Pulmonary Rehabilitation Club" platform bridges high-quality specialist resources with primary care, promoting the widespread use of pulmonary function testing, cultivating general practitioners with respiratory expertise, improving family doctor team skills, and establishing two-way referral channels, making COPD management more professional and scientific while improving healthcare resource utilization.

COPD screening faces numerous challenges. Early symptoms are often atypical, and patients may not recognize their significance. Many potential COPD patients receive medical services at widely distributed social clinics, pharmacies, or community health institutions where healthcare workers may have limited COPD knowledge and skills, often attributing symptoms to "bronchitis or emphysema" and causing missed diagnoses. Furthermore, COPD was not previously included in the national basic public health management program, resulting in insufficient proactive intervention at the primary level. The key to COPD prevention and treatment is early detection, but population-wide screening is not recommended. Screening targeted at high-risk populations yields better diagnostic outcomes, and focusing on individuals $ $40 years old or high-risk groups represents the priority for primary care in China. The "Pulmonary Rehabilitation Club" platform, established through coordination among local health administration and food and drug supervision departments, effectively integrates higher-level hospitals, community hospitals, patient families, and social medical resources into a tight COPD prevention and treatment network. Centered on medical-preventive fusion and guided by patient needs, this model emphasizes information sharing, resource sharing, and multi-party collaboration. In practice, broad participation from social forces significantly improves public COPD awareness. By moving screening forward to key locations and targeting high-risk populations, the platform achieves focused, cost-effective early detection without additional economic or workload burdens, addressing gaps in public awareness, early screening, and diagnostic rates.

Pulmonary function testing is the gold standard for COPD diagnosis, but equipment availability and utilization in China remain concerning. COPD patients often have multiple comorbidities. Current COPD management in China has many deficiencies, including low early screening and diagnosis rates, limited general practitioner capacity, insufficient public and patient awareness, inadequate health education, non-standardized pharmacological interventions, and lack of rehabilitation therapy. The combination of family doctor services and club ac-

tivities shows natural synergy in community COPD prevention and treatment. Integrating family doctor services with the "Pulmonary Rehabilitation Club" achieves complementary advantages: regular follow-up and personalized guidance from family doctors enable timely monitoring of disease dynamics and deep understanding of patient needs, allowing service strategy adjustments and more comprehensive, individualized treatment plans and rehabilitation recommendations that effectively reduce acute exacerbations and medical costs. Club activities overcome traditional outpatient time limitations and provide an interactive learning and communication platform. Regular health education, respiratory rehabilitation training, and psychological counseling in a relaxed environment enhance patients' self-management abilities and confidence, strengthening their belief in fighting the disease. This collective learning and interaction significantly improves self-management capacity and addresses deficiencies in health education and rehabilitation therapy.

The "screen-diagnose-treat-manage" process for COPD is systematic and continuous, aiming for early detection, accurate diagnosis, effective treatment, and comprehensive management. The "Pulmonary Rehabilitation Club" model innovatively applies this strategy in communities, providing new approaches for COPD management. This cost-effective model facilitates early screening, emphasizes standardized diagnosis and treatment, focuses on helping patients improve lifestyle habits and self-management capabilities, and effectively curbs disease progression, particularly demonstrating significant effectiveness in smoking cessation guidance. The process comprehensively meets patient needs for health education, psychological support, exercise recovery, and follow-up management, significantly improving quality of life, reducing acute exacerbations, and decreasing medical burden. In this model, patients become active health managers while family doctors serve as guides and educators, building trust and promoting self-management capacity. This strengthens physician-patient communication and promotes the popularization of contracted family doctor services, offering new perspectives for community health services. Given its effectiveness and feasibility, this model should be promoted as a routine measure with policy support, publicity, and incentive mechanisms. Building a close-knit medical consortium to facilitate information flow and resource sharing is key to ensuring successful implementation. However, challenges regarding sustainability, attractiveness, institutional integration, coordination, and mobilization of social medical resources remain to be addressed. Future efforts must continuously explore optimization strategies to ensure the "Pulmonary Rehabilitation Club" model continues to benefit more COPD patients.

References

[1] Chinese Medical Association, Chinese Medical Journals Publishing House, Chinese Society of General Practice, et al. Chinese guidelines for primary care diagnosis and management of chronic obstructive pulmonary disease (2024 edi-

tion) [J]. Chinese Journal of General Practitioners, 2024, 23(6): 578-602. DOI: 10.3760/cma.j.cn114798-20240326-00174.

[2] LI X C, LIU X S. Global Initiative for Chronic Obstructive Lung Disease 2018 update and clinical practice [J]. Journal of Clinical Internal Medicine, 2018, 35(11): 729-732. DOI: 10.3969/j.issn.1001-9057.2018.11.002.

[3] WHO. Global Burden of Disease Website [EB/OL]. [2020-10-15]. http://www.who.int/topics/global_{{{burden}}}*{{of}}*{disease}.

[4] National Health Commission of the People's Republic of China. Technical scheme for hierarchical diagnosis and treatment of chronic obstructive pulmonary disease [EB/OL]. (2017-02-09) [2023-04-10]. http://nyws.nanyang.gov.cn/ywbd/yzyg/239005.htm.

[5] FENG C L, WU W P, XU L Y, et al. Survey on cognition and management status of chronic obstructive pulmonary disease among community doctors in Beijing urban areas [C]// Proceedings of the 11th National Integrated Traditional Chinese and Western Medicine Academic Symposium on Respiratory Diseases. Beijing, 2010: 254-257.

[6] Shanghai Respiratory Disease Prevention and Treatment Alliance, Respiratory Branch of Shanghai Medical Association. Questionnaire survey on pulmonary function knowledge among community doctors in Shanghai [J]. Chinese Journal of Respiratory and Critical Care Medicine, 2018, 17(2): 165-168. DOI: 10.7507/1671-6205.201706007.

[7] ZHANG R B, HE Q Y. Cognition of chronic obstructive pulmonary disease among primary care physicians [J]. Chinese Journal of Prevention and Control of Chronic Diseases, 2009, 17(1): 61-63. DOI: 10.16386/j.cjpccd.issn.1004-6194.2009.01.022.

[8] WANG L W, CHEN R C. Current status and countermeasures of early screening and diagnosis of COPD in primary care [J]. Chinese Journal of Health Management, 2022, 16(4): 217-221. DOI: 10.3760/cma.j.cn115624-20220104-00004.

[9] GAO Y, ZHENG J P. Standardized pulmonary function training to support comprehensive prevention and control of chronic respiratory diseases [J]. Chinese Journal of Practical Internal Medicine, 2019, 39(5): 481-484. DOI: 10.19538/j.nk2019050101.

[10] HE Q Y. Investigation report on the diagnosis and treatment status of chronic obstructive pulmonary disease in rural primary care in China [J]. Chinese Journal of Respiratory and Critical Care Medicine, 2014, 13(1): 5-9. DOI: 10.7507/1671-6205.2015032.

[11] WEN F Q, CHEN L. Existing problems and reflections on the diagnosis and treatment of chronic obstructive pulmonary disease in China [J]. National Medical Journal of China, 2020, 100(2): 81-84. DOI: 10.3760/cma.j.issn.0376-2491.2020.02.001.

[12] Shanghai Respiratory Disease Prevention and Treatment Alliance, Respiratory Branch of Shanghai Medical Association. Questionnaire survey on pulmonary function knowledge among community doctors in Shanghai [J]. Chinese Journal of Respiratory and Critical Care Medicine, 2018, 17(2): 165-168. DOI: 10.7507/1671-6205.201706007.

[13] LUO C Y, HE Z Y. Chronic obstructive pulmonary disease and comorbidities [J]. Journal of Tuberculosis and Lung Diseases, 2023, 4(5): 407-412. DOI: 10.19983/j.issn.2096-8493.20230097.

[14] Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease (2023 REPORT) [EB/OL]. [2023-04-20]. https://godcopd.org/gold-reports/.

[15] CHEN M M, YE K L, XU Z J, et al. Current status and prospects of community management of chronic obstructive pulmonary disease in China [J]. Chinese General Practice, 2020, 23(3): 251-256. DOI: 10.12114/j.issn.1007-9572.2019.00.756.

[16] WEI L F, ZHOU L Z. Role of hypertension club activities in hypertension treatment [J]. Zhejiang Journal of Preventive Medicine, 2013, 25(7): 84-85. DOI: 10.19485/j.cnki.issn1007-0931.2013.07.034.

[17] YE G X. Effectiveness evaluation of community health self-management using health clubs as a carrier [J]. World Latest Medicine Information, 2019, 19(A0): 199-200. DOI: 10.19613/j.cnki.1671-3141.2019.100.098.

[18] CHEN Y J, ZHANG T H, LI Z X, et al. Effectiveness evaluation of "Happy Life Club" in community diabetes management [J]. Chinese General Practice, 2010, 13(25): 2823-2825. DOI: 10.3969/j.issn.1007-9572.2010.25.016.

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