ORIGINAL RESEARCH

Influence of Community Health Management on Self-management Ability and Pulmonary Function in Patients With Stable Chronic Obstructive Pulmonary Disease

Huijuan Fan, MM; Gang Zhao, MM; Li Sun, MM; Yanxiao Zhi, MM; Xiange Jin, MM; Xuanling Li, MM

ABSTRACT

Context • Chronic obstructive pulmonary disease (COPD) is a common chronic airway condition. Community health service centers can have significant value for improving the prognosis of older adults with chronic diseases.

Objective • The study intended to analyze the influence of community health management on the pulmonary function (PF) and self-management ability of patients with stable COPD, aiming to provide a reliable reference for future clinical applications.

Design • The research team performed a prospective controlled case study.

Setting • The study took place at a community health service center in Xining, China.

Participants • Participants were 116 stable COPD patients who received treatment at the center.

Intervention • The research team divided participants into two groups: (1) the intervention group who took part in community health management and (2) the control group who received usual care.

Outcome Measures • At baseline and postintervention, the research team: (1) measured participants' pulmonary function (PF)—forced vital capacity (FVC) and forced expiratory volume in 1s (FEV1)—and calculated the FEV1/FVC ratio; (2) assessed participants' symptoms using the modified British Medical Research Council (mMRC) scale and COPD Assessment Test (CAT); (3) tested participants' mobility using the six-minute walking test (6MWT) and the Barthel index (BI); (4) evaluated participants' quality of life using the Generic Quality of Life Inventory-74 (GQOL-74); (5) counted the rates of drug abuse, smoking control, and smoking cessation for both groups; and (6) created a COPD knowledge questionnaire survey on COPD awareness and used it to test participants' awareness.

Results • The research group had significantly higher FVC, FEV1, and FEV1/FVC levels and 6MWT, BI, and GQOL-74 scores (all $P < .001$) and significantly lower mMRC and CAT scores than those of the control group (both $P < .001$). No significant difference existed between the groups in the drug-abuse rate ($P = .511$), but the intervention group's percentage of participants who had controlled or quit smoking was significantly higher than that of the control group ($P = .033$). The intervention group's COPD awareness score was also significantly higher than that of the control group ($P < .001$).

Conclusions • Community health management can improve the rehabilitation and self-management of PF for stable COPD patients and can improve the quality of care, enhance patients' health level and quality of life, reduce medical investment, and lower the burden on patients and society. (*Altern Ther Health Med.* 2024;30(6):240-245).

Huijuan Fan, MM; Li Sun, MM; Yanxiao Zhi, MM; Xiange Jin, MM; Xuanling Li, MM; Medical Department, Qinghai University, Xining, China. **Gang Zhao, MM**, Department of General Surgery, the Fifth People's Hospital of Qinghai Province, Xining, China.

Corresponding author: Huijuan Fan, MM
E-mail: 2004980003@qhu.edu.cn

Chronic obstructive pulmonary disease (COPD) is a common chronic airway condition, with data indicating that global cases numbered approximately 100 million in 2018, and it has become a major chronic disease on the par with hypertension and diabetes, causing a huge disease burden.[1,2] The major symptoms of COPD include chronic cough, expectoration, and dyspnea. Without standardized treatment, COPD can evolve into cardiopulmonary failure or pulmonary heart disease, threatening patients' lives.[3]

The treatment of COPD not only occurs in the acute-exacerbation phase but also during the stable phase.[4] At present, maintenance drug therapy is the primary intervention for stable COPD to alleviate symptoms; in addition, improving daily living habits, such as avoiding exposure to risk factors, enhancing mobility to improve quality of life,

and carrying out pulmonary function (PF) training, is equally important for disease recovery.[5]

Community Health Centers

As one of the main places for chronic-disease intervention, the community health service center has significant value for improving the prognosis of older adults with chronic diseases.[6] Kelley et al and Vidal et al found that the implementation of community health management is effective in promoting the physical health of patients with chronic diseases such as hypertension and diabetes.[7,8]

Community health management refers to the comprehensive management of health-risk factors. The centers can achieve the maximum health effect through carrying out scientific and reasonable interventions according to patients' different living, diet, and exercise habits.[9]

Community Management and COPD

The positive role of community health management in the rehabilitation of COPD patients mainly lies in its: (1) systematization, (2) effectiveness, (3) sustainability, (4) accessibility to interventions, and (5) rational use of resources.

Systematization. As Bauer and Schiffman indicate, the service centers carry out individualized interventions on the basis of a unified management model, covering such topics as prevention and treatment, care, health rehabilitation, and health education, and they perform real-time follow-up to ensure that a patient implements the intervention plan systematically and comprehensively.[10]

Effectiveness. As Cravo et al indicate, the service centers' management plan involves the guidance and help of professionals to ensure that an individualized management program is suitable for each patient and that the centers carry out the targeted interventions according to the priorities of different patients' conditions, which can further enhance the efficacy of an established sputum-elimination plan.[11]

Sustainability. As Jiang et al indicate, medical staff and hospitalized physicians can form a lasting health-service relationship through the establishment of health records and the improvement of a follow-up system, and this close connection can improve patients' compliance with interventions and make the management plan sustainable.[12]

Accessibility to interventions. The programs can extend community nursing interventions into patients' homes, so that patients can obtain medical care, health services, and consultations at any time and conveniently. As Kearney et al indicate, the establishment of an expectoration program that involves the family can allow patients to effectively control their illnesses without leaving home, so that patients and their families can get multiple benefits in terms of economy and time.[13]

Rational use of resources. Community health management is patient-centered, family-based, and community-oriented. As Cross et al indicate, the healthcare professionals, through a variety of comprehensive interventions, can help patients to effectively control their conditions, alleviate the symptoms of airway obstruction, and reduce the waste of medical resources through misuse.[14]

Community Care in China

On a global scale, community care in China has been lagging behind. Except for a few economically developed cities, such as Beijing, Shanghai, and Shenzhen, community nursing in most areas is in a spontaneous and irregular state (no harmonized system of normative management and involvement of professionals).[15] The care not only lacks objective norms for nursing records and standards for nursing-quality evaluations but also has no rules or regulations for the development and implementation of community nursing services.[16]

For patients with hypertension, diabetes, and stable COPD, the time out of a hospital is obviously longer than the length of hospitalization. Therefore, correct and standardized community nursing is a key link to ensure the rehabilitation and health of such patients.[17]

Mohanty et al indicate that it's necessary to combine the management experience of chronic-disease primary hospitals to actively explore a reasonable and feasible community management model, striving to further systemize and professionalize community health management.[18]

Moreover, strengthening the COPD professional knowledge and training of grassroots medical staff, improving the COPD awareness level, and enhancing the training of COPD specialists is necessary.[19]

Current Study

Since 2021, the current research team's hospital has carried out community health management in the communities surrounding a community health service center in Xining, China, mainly including chronic-disease management, common disease prevention, rehabilitation guidance, and exercise and healthcare guidance, and it has accumulated enough cases for evaluation.

The current study intended to analyze the influence of community health management on the PF and self-management ability of patients with stable COPD, aiming to provide a reliable reference for future clinical applications.

METHODS

Participants

The research team performed a prospective controlled case study, which took place at a community health service center in Xining, China. Potential participants were stable COPD patients who received treatment at the center.

The study included potential participants if they: (1) met the diagnostic criteria for stable COPD,[20] (2) had had stable COPD for more than one month, and (3) were cognitively capable of participating.

The study excluded potential participants if they: (1) had serious limb movement disorders; (2) had major organ injuries, (3) had other serious respiratory diseases, malignant tumors, or severe disorders of the hematological, immune, or

endocrinal systems, or (4) had psychiatric or cognitive abnormalities or self-care disorders.

All participants provided informed consent and the hospital's ethics committee approved the study's protocols. The study will be conducted in strict compliance with the Declaration of Helsinki.

Procedures

Groups. The research team divided participants into two groups (according to the randomized numeric table method): (1) the intervention group who took part in community health management and (2) the control group who received usual care.

Outcome measures. At baseline and postintervention, the research team: (1) measured participants' PF indexes—forced vital capacity (FVC) and forced expiratory volume in 1s (FEV1)—using the Jianqiao Lung Function Tester FGY-200 (Hefei Jianqiao Medical Electronics, Hefei, Anhui, China) and calculated the FEV1/FVC ratio; (2) assessed participants' symptoms using the modified Medical Research Council (mMRC) scale[21] and the COPD Assessment Test (CAT)[22]; (3) tested participants' mobility using the six-minute walking test (6MWT) and the Barthel index (BI)[23]; (4) evaluated participants' quality of life using the Generic Quality of Life Inventory-74; [24] (5) counted the rates of drug abuse, smoking control, and smoking cessation for both groups, and (6) created a COPD knowledge questionnaire on COPD awareness and used it to test participants' awareness.

Interventions

Control group. The control group received usual care using conventional interventions. The research team instructed patients to take medicines on time, undergo regular reviews, maintain healthy living and eating habits, and carry out moderate physical exercise and breathing exercises.

Intervention group. The research team: (1) first established chronic-disease files for participants to record and evaluate their conditions; (2) formulated tailored treatment plans that covered such topics as health education, healthy life guidance, treatment guidance, and rehabilitation training, according to each patient's specific conditions; (3) implemented the plans.

The team: (1) first advised patients to quit smoking and to strengthen work protections or leave toxic or harmful working environments to reduce their inhalation of harmful gases; (2) encouraged patients to increase exercise to enhance their immunity; (3) instructed them to do more lung functional exercises to increase vital capacity and promote PF; and (4) urged them to eat a light diet, avoid greasy food, and ensure the intake of protein, so as to achieve balanced nutrition.

The team also: (1) conducted regular visits to enable patients to effectively understand their diseases, inform them of the disease's ability to harm and help them to correctly face it, and educate them on how to prevent recurrence; (2) gave patients medication and treatment guidance corresponding to the drugs they took to help them establish confidence in treatment.

Outcome Measures

Pulmonary function. including forced vital capacity (FVC), Forced Expiratory Volume in the first second (FEV1), and calculating FEV1/FVC. Higher values of these indicate better lung function.

Symptoms. The mMRC scale includes five grades, with a higher grade indicating a greater dyspnea degree. The CAT consists of eight items, with the highest score being 40 and a higher score suggesting a more serious illness than a lower score.

Mobility. For the 6MWT and the BI,[23] the normal range for 6MWT is 400-700 m. BI is scored out of 100, a higher test result denoted better mobility.

Quality of Life. The GQOL-74[24] has four domains: psychological function, physical function, social function, and material life. Each domains is worth 100 points out of 100, The score is positively associated with the quality of life.

Postintervention disease awareness. For the COPD questionnaire on COPD awareness, with a total score 30, the higher the score, the better the COPD awareness.

Statistical Analysis

The research team analyzed the data using SPSS23.0 statistical software (International Business Machines, Armonk, New York, USA). The team: (1) expressed the categorical variables as numbers (N) and percentages (%) and compared the groups using the Chi-square (χ^2) test and (2) expressed the continuous variables as means ± standard deviations (SDs) and compared the groups using the independent samples *t* test and paired t test. $P < .05$ indicated a significant difference.

RESULTS

Participants

The research team included and analyzed the data of 116 participants, 63 in the intervention group and 53 in the control group (Table 1). The intervention group included 42 males (66.7%) and 21 females (33.3%), and the control group included 36 males (67.9)%) and 17 females (32.1%).

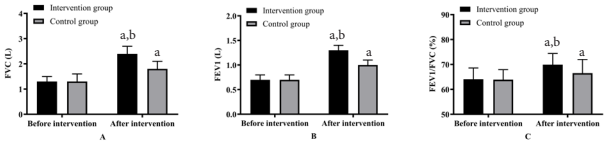
For the intervention group: (1) the mean age was 64.4 ± 5.6 years, (2) the mean BMI was 23.9 ± 2.5 kg/m^2, and (3) the mean duration of disease was 6.5 ± 1.5 years. For the control group: (1) the mean age was 65.0 ± 5.6 years, (2) the mean

Table 1. Participant's Demographic and Clinical Characteristics (N = 116)

Group	n (%)	Age, y Mean ± SD	Gender Male n (%)	Gender Female n (%)	BMI, kg/m^2 Mean ± SD	Duration of Disease, y Mean ± SD	Smoking Yes n (%)	Smoking No n (%)
Intervention	63 (54.31)	64.4 ± 5.6	42 (66.7)	21 (33.3)	23.9 ± 2.5	6.5 ± 1.5	59 (93.6)	4 ..
Control	53 (45.69)	65.0 ± 5.6	36 (67.9)	17 (32.1)	24.2 ± 2.3	6.6 ± 1.2	50 (94.3)	3 (5.7)
χ^2/t		0.575	0.021		0.668	0.696	0.024	
P value		.566	.886		.506	.391	.877	

Abbreviations: BMI, body mass index.

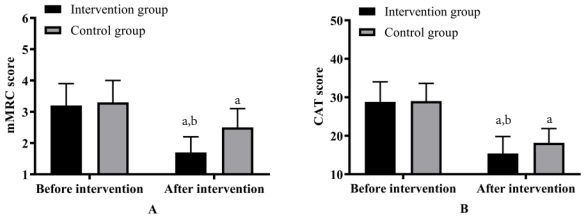
Figure 1. Comparison of Changes in PF Between Baseline and Postintervention for the Intervention and Control Groups and Between Groups Postintervention. Figure 1A shows FVC; Figure 1B shows FEV1; and Figure 1C shows FEV1/FVC.



[a]$P < .001$, indicating that both the intervention and the control group's FVC, FEV1, and FEV1/FVC had significantly increased between baseline and postintervention
[b]$P < .001$, indicating that the intervention group's FVC, FEV1, and FEV1/FVC were significantly higher than those of the control group postintervention

Abbreviations: FEV1, forced expiratory volume in 1s; FVC, forced vital capacity; PF, pulmonary function.

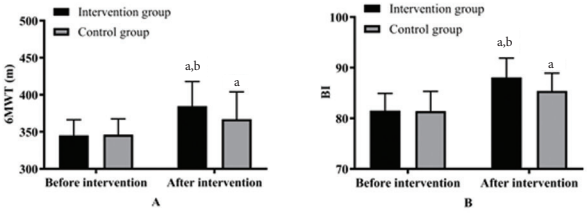
Figure 2. Comparison of Changes in Symptoms Between Baseline and Postintervention for the Intervention and Control Groups and Between Groups Postintervention. Figure 2A shows the mMRC score, and Figure 2B shows the CAT score.



[a]$P < .001$, indicating that both the intervention and the control group's mMRC and CAT scores had significantly decreased between baseline and postintervention
[b]$P < .001$, indicating that the intervention group's mMRC and CAT scores were significantly lower than those of the control group postintervention

Abbreviations: CAT, COPD Assessment Test; mMRC, modified British Medical Research Council.

Figure 3. Comparison of Changes in Mobility Between Baseline and Postintervention for the Intervention and Control Groups and Between Groups Postintervention. Figure 3A shows the 6MWT, and Figure 3B shows the BI.



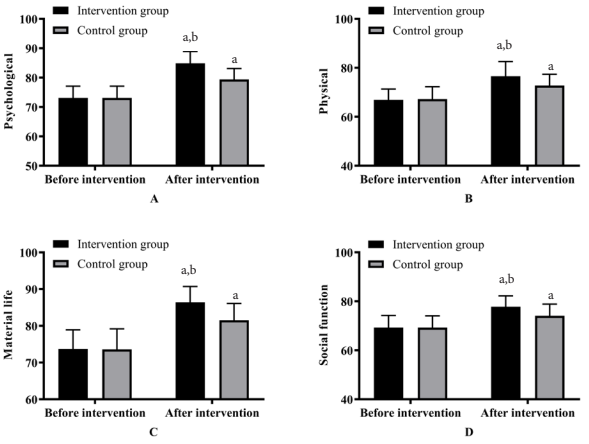
[a]$P < .001$, indicating that both the intervention and the control group's 6MWT and BI had significantly increased between baseline and postintervention
[b]$P < .001$, indicating that the intervention group's 6MWT and BI were significantly higher than those of the control group postintervention

Abbreviations: 6MWT, six-minute walking test; BI, Barthel index.

BMI was 24.2 ± 2.3 kg/m^2, and (3) the mean duration of disease was 6.6 ± 1.2 years.

In the intervention group, 59 participants were smokers (93.6%) and 4 weren't (6.4%), and in the control group, 50 participants were smokers (94.3%) and 4 weren't (5.7%).

Figure 4. Comparison of Changes in Quality of Life Between Baseline and Postintervention for the Intervention and Control Groups and Between Groups Postintervention. Figure 4A shows the psychological score; Figure 4B shows the physical score; Figure 4C shows the material life score; and Figure 4D shows the social score.



[a]$P < .001$, indicating that both the intervention and the control group's psychological, physical, material life, and social function scores had significantly increased between baseline and postintervention
[b]$P < .001$, indicating that the intervention group's psychological, physical, material life, and social function scores were significantly higher than those of the control group postintervention

No significant differences existed between the groups at baseline in age, gender, body mass index (BMI), duration of disease, or smoking habits ($P > .05$).

Pulmonary Function

No significant differences existed between the groups at baseline in FVC, FEV1, or FEV1/FVC, with $P > .05$ (Figure 1). Both groups had significant increases between baseline and postintervention ($P < .001$). Postintervention, the intervention group's FVC, FEV1, and FEV1/FVC were significantly higher than those of the control group (all $P < .001$).

Symptoms

No significant differences existed between the groups at baseline in the mMRC and CAT scores, with $P > .05$ (Figure 2). Both groups had significant decreases in the mMRC and CAT scores between baseline and postintervention ($P < .001$). Postintervention, the intervention group's mMRC and CAT scores were significantly lower than those of the control group ($P < .001$).

Mobility

No significant differences existed between the groups at baseline in the 6MWT and BI scores, with $P > .05$ (Figure 3). Both groups had significant increases in the 6MWT and BI scores between baseline and postintervention ($P < .001$). Postintervention, the intervention group's 6MWT and BI scores were significantly higher than those of the control group (both $P < .001$), indicating better mobility in the intervention group than in the control group postintervention.

Quality of Life

Figure 4 shows that no significant differences existed between the groups at baseline in the four dimensions of the GQOL-74—psychological function, physical function, material life, and social function—with $P > .05$ (Figure 4). Both groups had significant increases in the GQOL-74 scores between baseline and postintervention ($P < .001$). Postintervention, the intervention group's GQOL-74 scores were significantly higher than those of the control group ($P < .001$).

Postintervention Disease Awareness

Table 2 shows that two participant in the intervention group (3.2%) and three in the control group (5.7%) had misused drugs, but no significant difference existed between the groups postintervention ($P = .511$). The intervention group's percentage of participants who had controlled or quit smoking, at 56 (88.9%), was significantly higher than that of the control group, at 39 (73.6%), with $P = .033$. The intervention group's COPD awareness score, at 25.9 ± 3.2, was also significantly higher than that of the control group, at 21.8 ± 4.2 ($P < .001$).

Table 2. Disease Awareness Postintervention (N = 116)

Group	n (%)	Misuse of Drugs n (%)	Controlled or Quit Smoking n (%)	COPD Awareness Score Mean ± SD
Intervention	63 (54.31)	2 (3.2)	56 (88.9)	25.9 ± 3.2
Control	53 (45.69)	3 (5.7)	39 (73.6)	21.8 ± 4.2
$\chi 2/t$		0.431	4.547	5.882
P value		.511	.033	<.001

DISCUSSION

The current study indicated that community health management can be conducive to accelerating the rehabilitation of COPD patients, which not only helps to more effectively improve the overall quality of clinical medical services but also provides a more reliable guarantee of rehabilitation in COPD, a condition with an increasingly high incidence and with an extremely high clinical significance.

Postintervention, the intervention group's FVC, FEV1, and FEV1/FVC were significantly higher and its mMRC and CAT scores were significantly lower than those of the control group, which indicates that the use of community health management can promote PF recovery in COPD patients. Similar to Kelley et al's and Vidal et al's findings,[15,16] the current study found that the implementation of community health management was effective in promoting the physical health of patients with COPD. Moreover, the intervention group's 6MWT and BI scores postintervention were significantly higher than those of the control group, which further demonstrates the positive role of community health management in the rehabilitation of COPD patients. The intervention group's final quality of life and self-management ability were also significantly higher, which undoubtedly confirms the positive role of community health management in the rehabilitation of COPD patients.

Given the current state of community health management in China, the current research team believes that the government, society, and grassroots medical institutions in the future need to pay more attention to COPD and increase the prevention and treatment of COPD at the grassroots level. Finally, China should improve the ways and methods of COPD health education, strengthen health-behavior interventions, fundamentally change bad lifestyles and habits, actively promote simple PF examination in grassroots health centers, and regularly check high-risk groups to detect the disease and intervene as soon as possible.

However, the number of cases in this study was small, which may have led to chance in the findings. Also, the short period of this study did not allow assessment of the long-term prognosis of the patients. In addition, we need to add more objective indicators to assess the impact of community health management of COPD patients.

CONCLUSIONS

Community health management can improve the rehabilitation and self-management of PF for stable COPD patients and can improve the quality of care, enhance patients' health level and quality of life, reduce medical investment, and lower the burden on patients and society.

AUTHORS' DISCLOSURE STATEMENT

The authors indicate that they have no conflicts of interest related to the study.

AVAILABILITY OF DATA AND MATERIALS

The data that support this study's findings are available from the corresponding author upon reasonable request.

REFERENCES

1. Christenson SA, Smith BM, Bafadhel M, Putcha N. Chronic obstructive pulmonary disease. *Lancet*. 2022;399(10342):2227-2242. doi:10.1016/S0140-6736(22)00470-6
2. Ritchie AI, Wedzicha JA. Definition, Causes, Pathogenesis, and Consequences of Chronic Obstructive Pulmonary Disease Exacerbations. *Clin Chest Med*. 2020;41(3):421-438. doi:10.1016/j.ccm.2020.06.007
3. Labaki WW, Rosenberg SR. Chronic Obstructive Pulmonary Disease. *Ann Intern Med*. 2020;173(3):ITC17-ITC32. doi:10.7326/AITC202008040
4. Ferrera MC, Labaki WW, Han MK. Advances in Chronic Obstructive Pulmonary Disease. *Annu Rev Med*. 2021;72(1):119-134. doi:10.1146/annurev-med-080919-112707
5. Yang IA, Jenkins CR, Salvi SS. Chronic obstructive pulmonary disease in never-smokers: risk factors, pathogenesis, and implications for prevention and treatment. *Lancet Respir Med*. 2022;10(5):497-511. doi:10.1016/S2213-2600(21)00506-3
6. Higginson R, Parry A. Managing chronic obstructive pulmonary disease in the community setting. *Br J Community Nurs*. 2018;23(1):6-12. doi:10.12968/bjcn.2018.23.1.6
7. Kelley AT, Nocon RS, O'Brien MJ. Diabetes Management in Community Health Centers: a Review of Policies and Programs. *Curr Diab Rep*. 2020;20(2):8. doi:10.1007/s11892-020-1289-0
8. Vidal N, León-García M, Jiménez M, Bermúdez K, De Vos P. Community and health staff perceptions on non-communicable disease management in El Salvador's health system: a qualitative study. *BMC Health Serv Res*. 2020;20(1):474. doi:10.1186/s12913-020-05249-8
9. Yawn BP, Make B. Treatment of Chronic Obstructive Pulmonary Disease in the Primary Care Setting: How Can We Achieve More for Our Patients? *Am J Med*. 2018;131(9S):7-14. doi:10.1016/j.amjmed.2018.05.004
10. Bauer WS, Schiffman RF. Factors Influencing Self-Management of Chronic Obstructive Pulmonary Disease by Community-Dwelling Adults. *West J Nurs Res*. 2020;42(6):423-430. doi:10.1177/0193945919865532
11. Cravo A, Attar D, Freeman D, Holmes S, Ip L, Singh SJ. The Importance of Self-Management in the Context of Personalized Care in COPD. *Int J Chron Obstruct Pulmon Dis*. 2022;17:231-243. doi:10.2147/COPD.S343108
12. Jiang Y, Sun P, Chen Z, et al. Patients' and healthcare providers' perceptions and experiences of telehealth use and online health information use in chronic disease management for older patients with chronic obstructive pulmonary disease: a qualitative study. *BMC Geriatr*. 2022;22(1):9. doi:10.1186/s12877-021-02702-z
13. Kearney L, Wiener RS, Dahodwala M, et al. A mixed methods study to inform and evaluate a longitudinal nurse practitioner/community health worker intervention to address social determinants of health and chronic obstructive pulmonary disease self-management. *BMC Pulm Med*. 2022;22(1):74. doi:10.1186/s12890-022-01863-w
14. Cross AJ, Thomas D, Liang J, Abramson MJ, George J, Zairina E. Educational interventions for health professionals managing chronic obstructive pulmonary disease in primary care. *Cochrane Database Syst Rev*. 2022;5(5):CD012652.
15. Hu Y, Yao D, Hu H, Ung COL. Factors Affecting Community Pharmacist's Knowledge About Chronic Obstructive Pulmonary Disease (COPD) Management in China: A Cross-Sectional Survey Study. *Int J Chron Obstruct Pulmon Dis*. 2020;15:3171-3181. doi:10.2147/COPD.S280333
16. Mao R, Liu Z, Zhao Y, et al. Stable Chronic Obstructive Pulmonary Disease (COPD) Management Under a Tiered Medical System in China. *Int J Chron Obstruct Pulmon Dis*. 2022;17:181-194. doi:10.2147/COPD.S333274

17. Hu Y, Yao D, Ung COL, Hu H. Promoting Community Pharmacy Practice for Chronic Obstructive Pulmonary Disease (COPD) Management: A Systematic Review and Logic Model. *Int J Chron Obstruct Pulmon Dis*. 2020;15:1863-1875. doi:10.2147/COPD.S254477
18. Mohanty N, Salgado C, Rapoport A, Sarma Baxi R, Panzer J, Simon J. The people, process, and technology for population management in community health. *Fam Syst Health*. 2021;39(1):112-120. doi:10.1037/fsh0000591
19. Goebel JR, Bird MN, Martinez IL. Empowering the Latino Community Related to Palliative Care and Chronic Disease Management through *Promotores de Salud* (Community Health Workers). *J Palliat Med*. 2021;24(3):423-427. doi:10.1089/jpm.2020.0332
20. Celli BR, Fabbri LM, Aaron SD, et al. An Updated Definition and Severity Classification of Chronic Obstructive Pulmonary Disease Exacerbations: the Rome Proposal. *Am J Respir Crit Care Med*. 2021;204(11):1251-1258. doi:10.1164/rccm.202108-1819PP
21. Collin C, Wade DT, Davies S, Horne V. The Barthel ADL Index: a reliability study. *Int Disabil Stud*. 1988;10(2):61-63. doi:10.3109/09638288809164103
22. Cheng SL, Lin CH, Wang CC, et al; Taiwan Clinical Trial Consortium for Respiratory Disease (TCORE). Comparison between COPD Assessment Test (CAT) and modified Medical Research Council (mMRC) dyspnea scores for evaluation of clinical symptoms, comorbidities and medical resources utilization in COPD patients. *J Formos Med Assoc*. 2019;118(1 Pt 3):429-435. doi:10.1016/j.jfma.2018.06.018
23. Mahoney FI, Barthel DW. Functional Evaluation: The Barthel Index. *Md State Med J*. 1965;14:61-65.
24. Bao L, Shi C, Lai J, Zhan Y. Impact of humanized nursing care on negative emotions and quality of life of patients with mental disorders. *Am J Transl Res*. 2021;13(11):13123-13128.