Practice of cough and Asthma Pharmacy outpatient Service for patients with chronic obstructive pulmonary disease based on MTM

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Introduction. To explore the service model of standardized medication therapy management (MTM) for patients with chronic obstructive pulmonary disease (COPD) and to observe the efficacy of the application of MTM to cough and asthma pharmacy clinics.

Methods. The clinical pharmacy service process for asthma was established based on the MTM service concept. A self-comparison method was used to observe 108 patients with COPD who received inhalation therapy. The effectiveness of clinical pharmacy interventions for asthma was evaluated by assessing changes in indicators such as COPD Assessment Test (CAT) questionnaire for control assessment, Modified British Medicine (mMRC) questionnaire, medication compliance, incidence of adverse events and patient satisfaction before, 3 months after and 6 months after the intervention.

Results. Our hospital has developed a dynamic, whole process, closed-loop new model of clinical pharmacy services for asthma, focusing on the intervention of specialist pharmacists. Compared with the intervention before ,3 months and 6 months after the intervention, the patients' CAT score (21.74±4.25 vs. 16.64±4.51 vs. 12.72±4.36) and mMRC score (2.69±0.51 vs. 2.16±0.42 vs. 1.71±0.46) showed significant improvement. The incidence of drug-related adverse reactions has decreased, especially the incidence of adverse reactions caused by improper selection or use of inhalation preparations (11.11% vs. 2.78% vs. 0%) has significantly decreased. The patient medication compliance score (6.57±0.79 vs. 7.31±0.59 vs. 7.94±0.14) and patient satisfaction score (74.55±3.54 vs. 88.56±3.83 vs. 95.43±3.25) have improved significantly

Conclusion. Pharmacist-led MTM for asthma clinical pharmacy services promotes effective long-term patient control of COPD and enhances the pharmacist's pharmacy service competence and professional values.

Keywords. Medication therapy management; Chronic obstructive pulmonary disease; Inhalation preparations; Pharmaceutical service model; Efficacy evaluation.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a progressive decline in lung function caused by chronic airway inflammation and is the most common chronic airway disease. The global prevalence in people over 40 years of age is between 9% and 10%, and in China it is approximately 13.7% [1]. Various drug-related problems are common in the treatment of chronic obstructive pulmonary disease due to factors such as the specific formulation of the main therapeutic drug (inhaled formulations) and the complexity of the complications [2]. During the stable phase of COPD, up to 60%-80% of patients have poor control due to improper use of inhaled preparations, while up to 43.9% of patients experience drug-related adverse reactions due to improper use of combination therapy [3]. Therefore, the personalized specialized services for COPD patients based on the characteristics of their medication therapy has become a new focus in exploring outpatient COPD pharmaceutical services.

Medication therapy management (MTM) originates in the United States and is mainly provided by MTM pharmacists who have undergone standardized training and obtained MTM qualifications. Pharmacists provide patients with a complete, personalized medication management service, establish medication records for patients, correct medication mistakes and adjust medication dosages to maximize the efficacy of medicines. MTM is more suitable for long-term care of chronic disease patients. This study would share the practical experience of establishing an asthma pharmaceutical outpatient clinic at the People's Hospital of Hebei Province (referred to as "our hospital"), evaluate the influences of MTM-based asthma pharmaceutical

outpatient services on the efficacy, medication adherence, and incidence of drug-related adverse reactions in COPD patients, and explore the significance and value of asthma pharmaceutical outpatient clinics for COPD patients.

1. Establishment and application of Kechuan pharmaceutical outpatient service model

1.1 Personnel and facilities.

Our hospital established the Asthma Pharmacy Clinic in May 2019, aiming to provide specialized pharmaceutical services for outpatients with chronic airway diseases such as COPD. The clinic has a separate room for medication consultation and has the necessary hardware facilities such as computers, printers, telephones and so on. It is equipped with more than ten models of commonly used inhaler demonstrations. The consulting room is headed by two respiratory clinical pharmacists with ≥3 years of experience who have received specialist training in asthma pharmacy and have completed a standardized MTM course.

1.2 Work mode and work flow.

Our asthma and cough pharmacy clinic operates a 1-to-1 pharmacist-patient contract service, with face-to-face consultations at the time of consultation and follow-up visits via face-to-face appointments or online video. Each patient is seen for approximately 20-40 minutes per visit and the frequency of follow-up is generally monthly, with emergency visits when necessary. patients with COPD require long-term control with inhalers and pharmacists specifically manage the five elements of the MTM service [6] including medication review, individual medication records, medication-related planning, interventions and/or referrals, documentation, and follow-up, which forms the basis of the COPD patient asthma and cough pharmacy outpatient services in a new model. The workflow is shown in Figure 1.

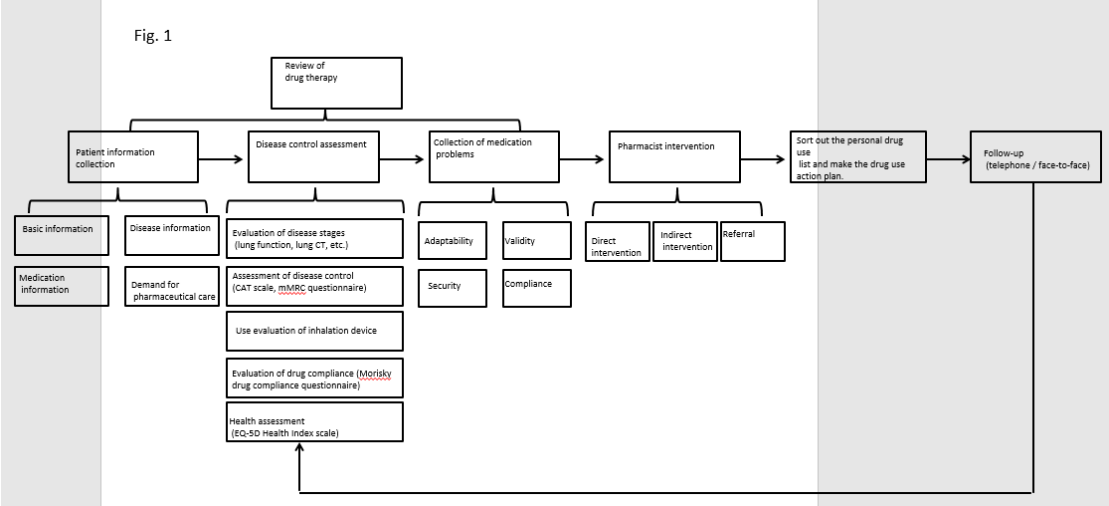

Figure 1 The work flow of cough and asthma pharmacy outpatient service for COPD patients

1.2.1 Review of drug therapy

Medication therapy review (MTR) is a comprehensive and systematic process of collecting patient information, including patient information collection, disease control assessment, and evaluation of drug-related problems (DRPs). MTR can be obtained through pharmaceutical consultations, electronic medical records, and other methods. MTR aims to collect accurate and comprehensive patient information to provide an adequate basis for dynamic assessment of treatment options and development of medication plans.

1.2.1.1 Patient information collection

Patient information includes basic patient information (name, gender, age, height, weight, smoking history, etc.); disease information (past medical history, present disease, family history, personal history, allergy history, etc.); personal medication history (use of major therapeutic drugs in the past 3 months, adverse drug reactions); and pharmaceutical service needs.

1.2.1.2 Disease control assessment:

The information on the patient's main symptoms, signs, and ancillary test results was collected to assess the severity of the patient's current condition, the effectiveness

of medication, compliance with medication and overall health status. The COPD patient evaluation criteria in this study are as follows: (1) pulmonary function: based on the FEV1 and FEV1/FVC levels, to evaluate the patient's disease stage is evaluated and determine whether the current choice of therapeutic drug is appropriate; (2) COPD assessment test (CAT) and the modified British Medical Research Council (mMRC) questionnaire: assessment of the effectiveness of drug therapy in the management of disease; (3) inhaler usage evaluation scale: this scale is independently designed by our hospital (Figure 2), which quantitatively scores each step of inhaler use. It is used to assist pharmacists in recording the correct use of inhalers by patients, and multiple evaluations can dynamically observe the improvement of inhaler use by patients; (4) Morisky Questionnaire: this questionnaire is used to evaluate patient medication adherence and determines whether medication errors or potential risks are caused by poor adherence; (5) EuroQol 5 Dimensional (EQ-5D) health index: it reflects the patient's self-assessment of their health status and helps understand the patient's needs for improving their health status in the next step.

Name:	Gender:	Age:	ID (in-patient / outpatient service) :
Diagnosis:			

Doctor's order for inhaled preparation (name / usage dosage)					
Operation method	**Content of pharmacist training**	**Patient's first operation**		**Follow-up evaluation**	
		Score	question	Score	question
Prepare for					
1Powder spray asked about the history of milk protein allergy (10 points)					
2. Recognition count window (5 points)					
3. Installation / pre-charge (5 points)					
4. Open the lid (2 points)					
5. Apply medicine (5 points)					
Drug inhalation					
1. Exhale as hard as you can and avoid the suction mouth (10 points)					
2. The device suction nozzle is placed in the entrance and the lips are wrapped tightly (10 points)					
3. Aerosol: inhale while pressing (slow and long) (10)					
Powder aerosol: inhaled (fast and fierce)					
4. Suck the mouth out of the mouth without opening the mouth (10 points)					
5. Continue to abandon 10 seconds (10 minutes)					
6. Return to normal breathing (2 points)					
Finishing					
1. Gargle correctly (preparations containing hormones) (10 points)					
2. Dry paper towels wipe inside and outside the suction mouth (3 points)					
3. Cover to receive medicine (3 points)					
3. Reasonable storage (5 points)					
4. Fasting water for 10 minutes (10 points)					
Total					
Date					

Patient signature: **Patient phone number:** **Evaluation pharmacist:**

1. Full score of no hormone in aerosol: 100, full score of hormone in powder: 110, full score of hormone in aerosol: 90, full score of hormone in aerosol: 100.

2. Evaluation criteria: score > 80% can be operated, take medicine home.

Score < 80% re-demonstration, re-evaluation to satisfaction.

3. Evaluation process: pharmacist explanation + demonstration-watch video-patient operation-pharmacist score-dissatisfaction: explain again + score-follow-up / follow-up evaluation.

Satisfied: take the medicine home

Fig. 2 Inhalation Device Use Assessment Scale

1.2.1.3 Assessment of medication-related issues: pharmacists assess patient-specific medication issues by investigating four areas, including appropriateness, effectiveness, safety and adherence. In patients with chronic obstructive pulmonary disease, particular attention should be paid to collecting medication-related problems with inhaled preparations. The pharmacist then develops a rational medication improvement plan based on the specific problems identified.

1.2.2 Pharmacist intervention: pharmacists take the lead in implementing and improving medication treatment plans, including (1) direct intervention: the pharmacist directly provides consultation, education, assessment, and other services to patients. For example, pharmacists educate patients with COPD on one-to-one inhaler use, quantitatively assess inhaler use, correct details of the inhalation process, and assist patients in identifying and managing common adverse effects such as dry mouth

and hoarseness. (2) Collaborative intervention: when patients need to adjust their medication, due to the limitations of prescription rights, the pharmacist should promptly contact the patient's attending physician to provide reasonable medication treatment advice and assist in formulating a new treatment plan. (3) Referral: while implementing the MTM drug service, if a patient has an emergency, such as collapse or shock. The pharmacist should immediately contact the relevant department for referral to avoid delay in treatment. Whatever intervention is used, records should be kept for later follow-up and tracking.

1.2.3 The pharmacist will create a personal medication list and develop a medication action plan based on the intervention results in written form, including information such as medication names, dosage forms, instructions for use, precautions, etc. Based on the new list of medications, a practical daily medication action plan will be developed for patients to maintain a healthy lifestyle (diet, exercise, smoking cessation, vaccinations), etc., to help them achieve their treatment goals effectively and safely.

1.2.4 Follow-up and monitoring: in order to dynamically evaluate the treatment effect and improvement of medication-related problems, and timely address new medication-related issues, it is necessary to conduct follow-up and monitoring of patients. In patients with COPD, follow-up should be on the effectiveness and safety of the inhalation device and medication adherence. Health follow-up with a focus on improvement of independent risk factors for COPD, such as smoking and occupational exposure.

2 Analysis on the effect of Kechuan pharmacy outpatient service

The efficacy of disease management, the correct use of inhalation devices, the incidence of adverse reactions, medication compliance and other aspects were analyzed to assess the specialist service for COPD patients in the cough and asthma pharmacy clinic of our hospital.

2.1 MATERIALS AND METHODS

2.1.1 Study subjects: 108 patients with COPD who received respiratory medicine outpatient services in our hospital from June 2021 to December 2021 were included in the study. Inclusion criteria: patients who met the diagnosis criteria of "Chronic Obstructive Pulmonary Disease Diagnosis and Treatment Guidelines (2021)" [1] and GOLD diagnostic and treatment guidelines [7].

Exclusion criteria: 1) patients who were unwilling to receive respiratory medicine outpatient services; 2) patients with cognitive function disorders such as senile dementia and brain atrophy; 3) patients with communication ability disorders such as language function abnormalities or visual impairments; 4) patients who were critically ill or had other diseases that could not cooperate with operations and evaluation of treatment effects; 5) patients without contact information or who could not cooperate with follow-up.

2.1.2 Research Methods: the study used a patient self-control method, where patients received cough and asthma pharmaceutical outpatient services at their initial visit and for the following 6 months. Patient-related indicators of drug treatment efficacy were collected before and after MTM services at the initial visit (pre-intervention), at 3-month follow-up (intervention for 3 months), and at 6-month follow-up (intervention for 6 months). The data was analyzed and evaluated by comparing pre-intervention to 3-month and 6-month interventions separately.

2.1.3 Evaluation index

(1) Disease control effectiveness: (1) CAT score: eight areas are assessed, including cough, sputum, chest tightness, wheezing, daily activities, time out and sleep, with scores ranging from 0 to 5 for each item. The higher the score, the more severe the symptoms. The sum of the scores for the eight items represents the final score. (2) The mMRC grading score: the degree of breathlessness is classified into 0-4

levels, corresponding to 0-4 points respectively. The higher the level of breathlessness, the higher the score.

(2) Assessment of correct use of inhalation device: the inhalation device use evaluation form is used to assign a corresponding score to each step of inhalation device use (a maximum score of 110 for steroid-containing MDIs, 100 for steroid-free MDIs or steroid-containing DPIs, and 90 for steroid-free DPIs). The pharmacist assesses the accuracy of each step completed by the patient during a demonstration and adds up the scores of each step to obtain the actual score. The patient's score rate is then calculated by dividing the actual score by the theoretical maximum score, and the results are judged according to the following criteria: excellent: 100%~90%; good: 89%~70%; qualified: 60%~69%; unqualified ≤59%.

(3) Adverse reaction (ADR) incidence: the ADRs related to medication were collected at the time of initial consultation, 3 months after intervention, and 6 months after intervention. The number of ADRs that occurred during the two follow-up periods only was collected, excluding ADR cases from the previous follow-up. ADRs were evaluated according to the National Adverse Drug Reaction Causality Assessment Criteria and those rated as "possible," "probable," or "definite" were counted as adverse reactions [8]. The ADR incidence rate was calculated as the number of ADR cases divided by the number of follow-up cases multiplied by 100%.

(4) Patient medication adherence: Patients completed the Morisky Medication Adherence Scale (MMAS) before intervention, at 3 months, and at 6 months. Pharmacists scored the questionnaire based on the responses. The scoring criteria were as follows: a perfect score of 8 indicated good adherence, a score of ≥6 and <8 indicated moderate adherence, and a score of <6 indicated poor adherence.

(5) Patient satisfaction: patients completed a patient satisfaction survey designed by our hospital before intervention, at 3 months, and at 6 months. The survey includes five items, including pharmacist appearance and courtesy, pharmacist professionalism, problem-solving ability, service attitude, and appointment and follow-up. Patients

rated each item based on their experience with pharmacist service. The rating standards for each item are: intolerable, 0 points; poor, 1-5 points; fair, 6-10 points; satisfactory, 11-15 points; very satisfactory, 16-20 points. The final satisfaction score is the sum of all ratings.

2.1.4 Evaluation index

The statistical software of SPSS21.0 version was used for analysis, the counting data was expressed by the number of cases (n). The measurement data was expressed by x ($\bar{x}\pm s$). T-test was used for the comparison between groups, and the counting data were expressed by (n)%. The comparison was made by χ 2 test ($P<0.05$).

2.2 RESULTS

2.2.1 The effectiveness of disease control (CAT score/mMRC score)

The study found that compared with before intervention, the CAT score and mMRC grading score of patients were significantly decreased after intervention, with statistical significance ($P<0.05$). Moreover, the decrease in CAT and mMRC scores was greater in patients after 6 months of intervention than after 3 months, indicating better disease control with longer intervention time (Table 2).

Table 1 CAT scores and mMRC rating scores before and after intervention（n=108）

time	CAT Evaluation				mMRC Evaluation			
	CAT Score	*t*	*P*	Range of change	mMRC Graded score	*t*	*P*	Range of change
Before intervention	21.74±4.25	--	--	--	2.69±0.51	--	--	--
Intervention for 3 months	16.64±4.51	17.78	<0.01	-3.00±5.07	2.16±0.42	10.936	<0.01	0.52±0.50
Intervention for 6 months	12.72±4.36	24.736	<0.01	-3.81±8.96	1.71±0.46	18.542	<0.01	0.97±0.55

2.2.2 The correct use rate of inhalation devices

The results showed that before the intervention, and 3 months and 6 months after the intervention, the average correct use rate of inhalation devices for patients was

84.75%, 97.34%, and 99.90%, respectively (P<0.05). The proportion of patients who achieved full marks increased significantly from 2.78% to 29.63% and 93.52%, respectively, showing a significant upward trend (Table 3). It was evident that the continued intervention significantly increased the correct use of the inhaler by the patients, with the longer the intervention, the higher the percentage of patients achieving a perfect score in correct use.

Table 2 Score for correct use of inhalers before and after intervention（*n*=108）

time	Proper use of suction device Scoring rate /%	*t*	*P*	Scoring rate Range of change	Number of full scores /*n*	Percentage of full scores /%
Before intervention	84.75±5.88	--	--	--	3	2.78
Intervention for 3 months	97.34±2.80	-25.44	<0.01	12.62±5.13	32	29.63
Intervention for 6 months	99.90±0.53	-27.367	<0.01	15.16±5.73	101	93.52

2.2.3 The incidence of adverse drug reactions (ADR) decreased

Patients receiving outpatient asthma medication services in the three periods before, 3 months after and 6 months after the intervention (36.11% vs. 21.3% vs. 10.19%). ADRs caused by drug interactions when using combination therapy (41.03% vs. 34.78% vs. 9.09%) and ADRs caused by inappropriate selection and use of inhalation devices (30.77% vs. 26.09% vs. 18.18%), with significant differences 6 months after the intervention (P<0.05,Table 3).

Table 3 The incidence of adverse reactions in patients before and after intervention（*n*=108）

time	Before intervention (n=108)	Intervention for 3 months (n=108)	Intervention for 6 months (n=108)
The number of cases of ADR in the 3 months before this follow-up	39	23	11
ADR Incidence rate	36.11%	21.30%	10.19%
χ^2	--	20.403	41.213
P	--	<0.01	<0.01
Number of cases of drug interaction to	16	8	1

ADR			
Drug interaction to ADR proportion	41.03%	34.78%	9.09%
χ^2	--	7.935	0.005
P	--	14.366	<0.01
Number of ADR cases caused by improper selection or use of inhaled agents	12	6	2
Proportion of ADR caused by improper selection or use of inhaled agents	30.77%	26.09%	18.18%
χ^2	--	5.803	12.706
P	--	0.016	<0.01
Other ADR	11	9	8
Proportion of other ADR	28.21%	39.13%	72.73%
χ^2	--	3.510	8.824
P	--	0.610	0.003

Note: total number of adverse reactions: only two cases of ADR were collected during the follow-up, but the number of ADR cases did not accumulate before the last follow-up.

2.2.4 The medication compliance of patients before and after intervention

As shown in the results (Table 4), the medication adherence scores of patients before the intervention, at 3 months, and at 6 months (6.57±0.79 vs. 7.31±0.59 vs. 7.94±0.14) showed an increasing trend, indicating that patients' medication adherence gradually improved. Moreover, as the intervention time prolonged, the number of patients with good compliance was increased (Table 4), and the difference was statistically significant (P < 0.05).

Table 4 The medication compliance of patients before and after intervention（*n*=108）

Follow-up time	Compliance score	*t*	*P*	Change range of score	Number of cases of good compliance /*n*	Good compliance in proportion /%	χ^2	*P*	Number of cases of poor compliance /*n*	Proportion of poor compliance /%	χ^2	*P*
Before intervention	6.57±0.79	--	--	--	8	7.41	--	--	18	16.67	--	--

Intervention for 3 months	7.31±0.59	-14.91	<0.01	0.74±0.51	22	20.37	7.587	0.005	5	4.63	8.223	0.04
Intervention for 6 months	7.94±0.14	-18.82	<0.01	1.38±0.76	93	86.11	134.36	<0.01	0	0.00	19.64	<0.01

2.2.5 Patient satisfaction scores

The patient satisfaction scores increased after receiving cough and asthma medication outpatient services (74.55±3.54 vs. 88.56±3.83 vs. 95.43±3.25), and the difference was statistically significant ($P < 0.05$). Moreover, the increase in satisfaction scores at 6 months follow-up was higher than that at 3 months (20.89±4.02 vs 14.01±3.65).

Table 5 The patient satisfaction before and after intervention（*n*=108）

Follow-up time	Patient satisfaction score	*t*	*P*	Range of change
Before intervention	74.55±3.54	--	--	--
Intervention for 3 months	88.56±3.83	-39.755	<0.01	14.01±3.65
Intervention for 6 months	95.43±3.25	-53.699	<0.01	20.89±4.02

3 DISCUSSION

Numerous domestic and international practice studies have confirmed that pharmacist interventions in pharmaceutical services can effectively improve the therapeutic effects of medications and reduce the incidence of adverse drug reactions [9-11]. As the number of patients with COPD in China increases, ad hoc pharmaceutical services are no longer sufficient to meet the needs of the population. More patients desire long-term, dynamic, and personalized specialist pharmaceutical services. Our MTM-based asthma and COPD medication clinic has opened up a new service model for COPD chronic disease specialist medicine services.

3.1 Improvement of COPD specialist drug services through asthma pharmacy clinics

MTM is still in the exploratory stage in China. Although its service concept and

five elements are gradually understood by more and more medical workers, there is no standardized and unified service model and process for the characteristic specialist drug service of COPD patients in China [11-12]. Based on the five elements of and the management practices of patients in our chronic obstructive pulmonary clinic, this study established an outpatient cough asthma service model with active intervention by specialist pharmacists and long-term dynamic management. This service model requires only 1-2 respiratory pharmacists to carry out a full range of chronic disease medication management services for COPD patients. Moreover, each MTM service component is fully integrated with the pharmacological characteristics of MTM patients and is more suitable for their needs. In particular, the education and evaluation of the administration of inhalation devices is performed on a one-to-one basis by a pharmacist, and the use of various inhalation devices at different times is dynamically evaluated by means of quantitative scoring, thus effectively ensuring the correct and rational use of inhalation preparations. In the assessment of drug administration, more attention should be paid to the assessment and management of inhaled preparations in terms of appropriateness of drug selection, drug-drug interactions and common adverse reactions, so that patients can receive more professional and refined advice on drug adjustment and improve the level of accurate and effective treatment for patients with chronic diseases. In the follow-up, attention should be paid to health education and follow-up of patients on smoking, occupational exposure and other disease risk factors. At the same time, in view of the poor compliance of COPD patients with long-term medication, we should pay attention to accompanying monitoring and intervention to improve patients' confidence in disease treatment.

3.2 Cough and asthma pharmacy outpatient service improves the treatment outcome of COPD patients

3.2.1 Effective long-term control of patients with chronic obstructive pulmonary disease

COPD patients are characterized by chronic cough, expectoration, and dyspnea. The long-term goal of treatment is to improve symptoms and reduce acute attacks [1,7]. In this study, starting from the guidelines for disease diagnosis and treatment, according to the changes of patients' common symptoms, CAT and mMRC scale were used to evaluate the efficacy of drug treatment. In this study, more than 90% of patients had a significant reduction in CAT and mMRC scores after the pharmacist's intervention, indicating that their common symptoms were significantly relieved and their disease management was more effective. In addition, with the extension of pharmacist intervention time, the relief of disease symptoms was better, showing a gradual decline in CAT and mMCR scores. This is consistent with the report at home and abroad that the symptom control of COPD patients improved more than 60% after pharmacists gave MTM intervention[12-13]. It is evident that long-term dynamic monitoring of chronic disease by pharmacists using the COPD Specialist Assessment Scale allows patients and pharmacists to focus together on the improvement of disease symptoms and promotes effective long-term control of chronic disease in COPD patients.

3.2.2 Appropriate and rational administration of inhaled preparations

The correct administration of inhaled preparations in patients with chronic obstructive pulmonary disease (COPD) is key to good management. More than 50% of patients with stable COPD have made more than one mistake with their inhaler, and more than 60% have had poor outcomes due to inappropriate usage of the inhalation device [14]. Outpatient care for cough and asthma medication significantly improves correct inhaler use in COPD patients, with the proportion of patients scoring a perfect score at 6 months of the intervention at over 90%. The cough asthma pharmacy clinic provides a multi-session educational evaluation service to ensure the correct use of inhalers, including (1) face-to-face education, (2) a quantitative scoring model, and (3) cyclical evaluation for truly dynamic supervision.

3.2.3 The incidence of adverse events can be reduced

Patients with stable COPD mainly use inhaled medication at home and have a high incidence of adverse reactions to inhaled medication due to poor self-identification of adverse drug reactions. Moreover, COPD patients are mostly elderly and often take multiple medications for various underlying conditions, making them prone to adverse drug interactions and increasing the risk of related adverse drug reactions. The incidence of ADRs in patients aged 65 and older taking five or more medications is as high as 21.3% [15]. In this study, the pharmacist provided individualized education to patients on the common adverse reactions of their medications, which improved their awareness of these reactions. In addition, pharmacists use their expertise in chrono pharmacology and pharmacodynamics to select drugs with the least potential for drug interactions, to develop rational dosing schedules, and to avoid adverse drug reactions. As the pharmacist's intervention and follow-up time increased, the incidence of adverse reactions decreased significantly, especially those related to inhaled preparations, ensuring the safety of medication use in patients.

3.2.4 The improvement of patients' medication compliance and satisfaction

Based on MTM, the pharmacy clinic for cough and asthma always puts the patient at the center, starting from the characteristics of the specialty and using a one-on-one contract between the pharmacist and the patient, providing full-process accompanied services. Patients in long-term treatment experience good MTM services first-hand, reducing feelings of isolation and helplessness in long-term treatment and increasing confidence and satisfaction with treatment. Through long-term communication and exchange between the pharmacist and the patient, the patient's trust in the pharmacist increases, and the behavior of self-interruption of treatment drugs or arbitrary adjustment of treatment plans decreases, and medication compliance is significantly improved. Our study showed that after 3 and 6 months of follow-up, the medication compliance and satisfaction of patients have improved, and with the extension of follow-up time, the degree of improvement has shown an increasing trend, which is

consistent with many current research results [12,16].

3.3 Problems of Kechuan Pharmaceutical outpatient Service

The asthma pharmacy clinic launched by our hospital has been recognized and trusted by COPD patients and was evaluated by the Chinese Medical Association as a national demonstration center for asthma pharmacy clinics. However, some issues have been identified during the service. Currently, the asthma pharmacy clinic provides free consultation, but resources such as specialized pharmacist training, service equipment and software, and pharmacist service time require certain costs. We hope that relevant departments such as medical insurance can provide subsidies or establish related pharmaceutical charging standards in the future. Most of our patient follow-up visits are in person or via online video communication. As a result, the follow-up rate is relatively high for some patients who are bedridden or have limited mobility. We plan to work with community pharmacists in the future to enhance the management of patient follow-ups. In addition, some forms required for self-monitoring by patients (such as compliance assessment forms, self-assessment forms for health conditions, etc.) need to be filled out manually during follow-up visits, which consumes a lot of time. In the future, we plan to prepare and distribute these forms as online questionnaires to facilitate patients to fill them out anytime, anywhere, and to save follow-up time.

To sum up, the Cochrane Medicine Clinic, as a new model of specialist pharmaceutical care, advocates patient-centered, proactive care and supervision by pharmacists to provide patients with comprehensive, multi-faceted and sustainable pharmaceutical care. It can better address the long-term treatment needs of patients with chronic diseases, better reflect the professional value of pharmacists, optimize social public health resources and promote the improvement of pharmaceutical care capacity.

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