

Construction and Intervention Effectiveness Analysis of a Combined Cough and Asthma Pharmacy Outpatient Service Model for Children's Asthma

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Abstract: To explore the service model and application effectiveness of cough and asthma pharmacy combined outpatient service for chronic respiratory diseases, researchers collected 107 cases of childhood asthma from July 2021 to December 2022, and divided them into two groups based on their age, receiving routine pharmaceutical services and personalized pharmaceutical services. Children under 5 years old received TRACK scores, while children over 5 years old received C-ACT scores to evaluate their asthma control, and statistical analysis was conducted. After providing pharmaceutical services, the TRACK score and C-ACT score of the experimental group were significantly higher than those of the control group, and the differences were statistically significant. The joint medical clinic established by clinical pharmacist cough and asthma pharmacy and pediatric asthma standardization clinic can significantly improve the treatment effect of pediatric asthma, and reduce recurrence rate and treatment costs.

Keywords Cough and Asthma; Pharmacy Outpatient Service; Combined Outpatient Service; Service Model; Childhood Asthma

1. Introduction

Bronchial asthma (hereinafter referred to as childhood asthma) is the most common chronic respiratory disease in children, with a continuously rising prevalence rate in China [1]. Although significant progress has been made in the diagnosis and treatment of childhood asthma in China, about 30% of urban children with asthma are still not diagnosed in time, and more than 20% of children with asthma have not achieved good control.

Driven by medical policies and changes in pharmacy service models, pharmacy outpatient services, as a new model of pharmacy services, are increasingly gaining attention in the pharmacy community. In 2020, the Pharmacy Service Committee of the Chinese Pharmaceutical Association, together with the Respiratory Medicine Branch of the Chinese Medical Association and the Respiratory Medicine Branch of the Chinese Medical Doctor Association, jointly initiated the "PCCM Cough and Asthma Pharmacy Service Outpatient Project" to promote the establishment of Cough and Asthma Pharmacy Service Clinics (CWPC) [2]. Consequently, our hospital's Pharmacy Department, in collaboration with PCCM and Pediatrics, has established a joint medical-pharmacy outpatient service, primarily serving patients with COPD, adult asthma, childhood asthma, and chronic cough. This study aims to explore the involvement of clinical pharmacists in the joint medical-pharmacy outpatient clinic, focusing on educating asthma children and their families on inhaler use, lifestyle guidance, self-monitoring, and systematic data entry. The improvement in asthma in children (assessed by TRACK score, C-ACT score) and the incidence of adverse reactions, among other indicators, are used to evaluate the improvement in childhood asthma.

2. Research Foundation

2.1 Establishment and Application of the combined Cough and Asthma Pharmacy Outpatient Clinic Model

Regulations and Infrastructure Preparation: The hospital established a combined cough and asthma pharmacy outpatient clinic in July 2021, setting up an independent consultation room

with comprehensive working regulations and standards. The clinic is equipped with hardware including computers, printers, pharmacotherapy reference books, commonly used lung inhaler teaching aids, and educational brochures for common respiratory diseases. Software resources include outpatient/inpatient HIS systems, chronic disease management systems (such as a cloud platform for standardized medical records management of childhood asthma), educational videos for various lung inhalers and holding chambers. Various workload forms have been established, including "Patient Basic Information Registration Form," "Patient Medication Record Form," "Patient Medication Education Record Form," "Patient Follow-up Record Form," "Patient Medication Adherence Evaluation Form," "Patient Disease and Medication Knowledge Assessment Form," "Inhaler Technique Assessment Form," "Physician and Patient Satisfaction Evaluation Form for Pharmacist Work," and other work record forms.

Service Model Establishment: The combined cough and asthma pharmacy outpatient clinic establishes records for outpatient children, including the child's medical history, medication information, laboratory test results, educational assessments, and follow-up records. The clinic also uses WeChat groups to disseminate medication knowledge, enhancing the awareness and acceptance of the combined cough and asthma pharmacy outpatient clinic among children's families. Physicians conduct consultations with the children, make definitive diagnoses, assess the condition, and prescribe medication for those in need. Clinical pharmacists focus on understanding patients' medication information, assessing the rationality and adherence to medication, and manage drug therapy for the children; clinical pharmacists provide individualized medication guidance and interactive teaching to children and their families; during the operation of the combined cough and asthma pharmacy outpatient clinic, common issues in children's medication processes are collected, and clinical pharmacists create targeted health promotion and medication guidance manuals; doctors and pharmacists combine online (video follow-up) and offline approaches to follow up and communicate with the children and their families, understanding the improvement in

symptoms after medication, and guiding the children and their families in the proper use of medication. Clinical pharmacists conduct regular monthly and quarterly follow-ups, ensuring traceability of the child's condition and predictable health management.

Phase Ic. The Combined Cough and Asthma Pharmacy Outpatient Clinic Service Process: Through practice, a pharmacy service model suitable for local children with asthma has been explored. (Figure 1)

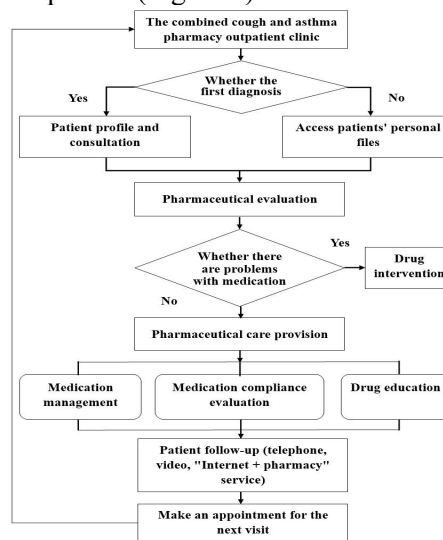


Figure 1. Cough and Asthma Pharmacy Outpatient Service Process

2.2 Practice and Service Effect Analysis of the Combined Cough and Asthma Pharmacy Outpatient Clinic Data and Methods Data

We collected the pharmacy service data from 107 asthma patients who visited the combined cough and asthma pharmacy outpatient clinic from July 2021 to December 2022, as well as the "Childhood Asthma Standardized Medical Record Management Cloud Platform" including the "Childhood Respiratory and Asthma Control Test (TRACK) Score" and the "Childhood Asthma Control Test (C-ACT) Score" forms.

3. Method

3.1 Research Method

The children were stratified by age into groups under 5 years and over 5 years. Within each group, they were randomly divided into control and experimental groups. Comparative analysis was conducted on the effects of drug treatment in asthmatic children receiving

routine pharmacy services and individualized pharmacy services, as well as the effects of drug treatment in asthmatic children before and after receiving individualized pharmacy service interventions.

3.2 Evaluation Indicators

According to the age of the children, two groups were formed. For children under 5 years old, the "Childhood Respiratory and Asthma Control Test (TRACK) Score" was used, and for children over 5 years old, the "Childhood Asthma Control Test (C-ACT) Score" was used, these two scores was used to assess asthma control.

3.3 Statistical Processing

Data were processed using SPSS 25.0 statistical software. Count data were expressed as cases (percentage), and the χ^2 test was used. Measurement data were expressed as $\bar{x}\pm s$, and the t-test was used for inter-group comparisons. A P-value <0.05 was considered statistically significant.

Table 1. Childhood Respiratory and Asthma Control Test (TRACK) Scores (Under 5 Years Old)

	Male	Female	Age	TRACK Score	P-value
Control Group (27 children)	20	7	3.878 \pm 0.1250	71.801 \pm 1.2408	0.000
Experimental Group (32 children)	16	16	3.972 \pm 0.1574	87.728 \pm 0.9858	

Table 2 Experimental Group Childhood Respiratory and Asthma Control Test (TRACK) Scores (Under 5 Years Old)

	TRACK Score	P-value
Before Intervention (32 children)	70.681 \pm 2.4819	0.000
After Intervention (32 children)	93.266 \pm 0.7394	

In children over 5 years, comparison of C-ACT scores between the control group and the experimental group showed that after implementing individualized pharmacy services, the C-ACT score of the experimental

4. Results

The Combined Cough and Asthma Pharmacy Outpatient Clinic Service Process: Through practice, a pharmacy service model suitable for local children with asthma has been explored.

In children under 5 years, comparison of TRACK scores between the control group and the experimental group showed that after implementing individualized pharmacy services, the TRACK score of the experimental group was significantly higher than that of the control group in the same period, and the difference was statistically significant ($P < 0.05$) (Table 1).

In children under 5 years, comparison of TRACK scores before and after implementing individualized pharmaceutical services in the experimental group showed that the TRACK score of the children was significantly higher after the service compared to before, and the difference was statistically significant ($P < 0.05$)(Table 2).

group was significantly higher than that of the control group in the same period, and the difference was statistically significant ($P < 0.05$)(Table 3).

Table 3 Childhood Asthma Control Test (C-ACT) Scores (Over 5 Years Old)

	Male	Female	Age	C-ACT Score	P-value
Control Group (23 children)	13	10	7.230 \pm 0.4822	22.513 \pm 0.1337	0.000
Experimental Group (25 children)	16	9	7.888 \pm 0.4264	25.288 \pm 0.1825	

In children over 5 years, comparison of C-ACT scores before and after implementing individualized pharmaceutical services in the experimental group showed that the C-ACT score of the children was significantly higher after the service compared to before, and the difference was statistically significant ($P < 0.05$)(Table 4).

Table 4 Experimental Group Childhood Asthma Control Test (C-ACT) Scores (Over 5 Years Old)

	C-ACT Score	P-value
Before Intervention (25 children)	21.864 \pm 0.4461	0.000
After Intervention (25 children)	26.220 \pm 0.1394	

5. Discussion

The prevalence of childhood asthma in China has shown a significant upward trend over the past 20 years. The cumulative prevalence of asthma in urban children under 14 years old was 1.09% in 1990, 1.97% in 2000, and 3.02% in 2010 [3]. The incidence of asthma in children in China is high, and the control rate is low. Some children's asthma is not well controlled, and parents lack sufficient awareness of the dangers of acute asthma attacks. Among all children with asthma, only 58.7% use inhaled corticosteroids, and only 71.4% use bronchodilators [4, 5]. At the same time, there is a shortage of pediatricians (especially in remote areas and primary hospitals), with a doctor-to-patient ratio of 1:3500, far lower than the 1:1000 in developed countries in Europe and America [6-8]. With the standardization of Pulmonary and Critical Care Medicine (PCCM) departments and the establishment of standardized outpatient clinics for childhood asthma, how to provide medication guidance for patients with chronic respiratory diseases is increasingly attracting the attention of doctors, nurses, and pharmacists. Given the different focus of their work, it is increasingly important for clinical pharmacists to provide direct, responsible pharmaceutical technical services to patients, utilizing their professional expertise. This includes improving patient medication adherence and the safety, cost-effectiveness, and efficacy of drug therapy to achieve rational and standardized medication use. To this end, our hospital's clinical pharmacists actively explore standardized models of pharmacy outpatient services, jointly establishing a cough and asthma pharmacy outpatient clinic with PCCM and Pediatrics, and together exploring a pharmacy service model suitable for local patients.

The key to pharmacy services lies in clinical practice. The establishment of the cough and asthma pharmacy outpatient clinic addresses the issue of children and elderly caregivers not understanding abstract information from instruction manuals and brochures. Clinical pharmacists provide face-to-face guidance, educating children and their families on the correct use of inhalers and peak flow meters, identifying problems in their usage, thus preventing issues with treatment effectiveness

and accuracy of monitoring data due to inadequate operations from merely reading instructions or watching videos. Clinical pharmacists offer drug therapy management for children, explaining to their families about the disease treatment, drug mechanisms, operation principles of devices, expected course of disease control, etc. They guide families in managing the child's lifestyle and habits appropriately and paying attention to potential adverse drug reactions. During the COVID-19 pandemic, the combined cough and asthma pharmacy outpatient clinic used the "Internet + Pharmacy" and the "Video Follow-up" module of the "Childhood Asthma Standardized Medical Record Management Cloud Platform" for online re-consultations and follow-ups with the children. Online checks were made for the standard use of inhalers, holding chambers, and peak flow meters. Depending on the child's age, different scales (TRACK/C-ACT) were used for periodic efficacy evaluations. Reminders were given to children and their families to establish asthma diaries through mobile apps, record peak flow values, check in online for medication, and monitor asthma control. A combination of various methods is used to encourage children and their families to adhere to long-term, continuous, standardized, and individualized asthma treatment.

During the operation of the combined cough and asthma pharmacy outpatient clinic, the main existing issues include: the acceptance level of children's family members towards allergen testing and regular re-examinations of lung function, which affects the completeness of the children's asthma records and the evaluation of treatment effectiveness. Children and their families do not place enough importance on standardized treatment, failing to adhere to medication, consistent online check-ins, and uploading peak flow values. Some families are not very receptive to online re-consultations and follow-ups, affecting the pharmacists' management of medication for the children [9-11].

6. Conclusion

In summary, the cough and asthma pharmacy service outpatient clinic is still in its initial and exploratory stages. It needs to accumulate experience in clinical practice, continuously improve the level of pharmacy service

management, expand pharmacy service models, explore distinctive pharmacy services, and promote the sustainable development of the cough and asthma pharmacy service outpatient clinic. This will fully utilize the role of pharmacists in the management of chronic respiratory diseases.

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