The Role of the Pharmacist in Improving Asthma Care

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Preface

Whether they work in community pharmacies, hospitals, or clinics, pharmacists are in a pivotal position to contribute to the overall management of asthma. Every year, pharmacists fill more than 7 million prescriptions for asthma medications, which remain the principal treatment for the disease. Pharmacists have many other opportunities to assist in the management of asthma.

Pharmacists can educate patients by providing information on the types and purposes of asthma medications and by demonstrating how to use inhaled medications and peak flow meters. They can reinforce and clarify the instructions contained in a patient's individual asthma management plan. In addition, pharmacists can refer patients who use over-the-counter medications to physicians for medical care.

Pharmacists can be a valuable source of important information for other members of the health care team. They can monitor medication use and refill intervals and use this information to alert prescribers and help identify patients with poorly controlled asthma. Pharmacists also can share information about asthma medications and the National Asthma Education and Prevention Program guidelines on the diagnosis and management of asthma with members of the health care team.

This guide was designed to help pharmacists identify ways that they can actively participate on the asthma care team. Written by pharmacists, it contains practical guidance for filling six important educational and information-sharing roles in asthma management. I hope that pharmacists throughout the country will use these ideas in a team effort to improve the overall health of people with asthma.

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Introduction

Asthma is a chronic disease of the airways characterized by airway inflammation, increased responsiveness to a variety of stimuli, and airway obstruction that reverses spontaneously or as a result of appropriate therapy. Symptoms of asthma include cough, wheeze, tightness of the chest, shortness of breath, and increased sputum production.

Asthma is a highly variable disease. Some patients have extended symptom-free periods between episodes and experience symptoms only when they exercise or are exposed to allergens or viral respiratory tract infections. Other patients have continuous symptoms or frequent recurrent acute episodes. The pattern of symptoms varies among patients. For example, some patients may cough only at night, whereas others may experience symptoms such as chest tightness and wheezing both day and night. In addition, the pattern, frequency, and intensity of symptoms may vary in an individual over a period of time.

Asthma affects approximately 12 million people in the United States. Recent data from the National Health Interview Survey indicate that the prevalence of the disease increased 41 percent from 1982 to 1992.[1] Moreover, office visits to physicians and hospitalizations for asthma have increased during this same period. In 1990, the total estimated cost of illness related to asthma in the United States was approximately $6.2 billion.[2] A large portion of these expenditures was for emergency department (ED) visits and hospitalizations, which often can be prevented with patient education, appropriate therapy, and patient adherence to physicians' recommendations.

More disturbing is that deaths from asthma have increased 46 percent among the general population and 52 percent among African Americans in the last decade.[3] During this time, more effective asthma therapies have become available. For example, inhaled corticosteroids have been available (but not widely used) in the United States since 1976. The current emphasis on treating asthma as an inflammatory disease focuses greater attention on the use of anti-inflammatory agents to control asthma more effectively, reduce morbidity and mortality, and improve asthma patients' quality of life.

The National Asthma Education and Prevention Program Expert Panel Report, *Guidelines for the Diagnosis and Management of Asthma,* released in August 1991 concluded that asthma is underdiagnosed and undertreated in the United States.[4] Common reasons for underdiagnosis and undertreatment on the part of patients and clinicians include the following:

- Not recognizing that a person has asthma.
- Not expecting enough from therapy.
- Not understanding the benefits and risks of different therapies.
- Not appreciating the chronic nature of asthma and not using (or adhering to) preventive therapy.
- Not accurately assessing the severity of an episode.
- Not recognizing signs of deterioration.
- Not treating episodes adequately.
- Not identifying triggers associated with the patient's asthma and not taking action to minimize or prevent exposure to such triggers (e.g., cigarette smoke).

An important factor contributing to the undertreatment of asthma is not appreciating the necessity to treat the underlying inflammation in asthma. Patients may not understand that short-acting beta$_2$-agonists treat only bronchospasm and cannot reduce or prevent the underlying problem of inflammation. Patients with moderate or severe asthma should take anti-inflammatory medication on a daily basis to prevent symptoms. Further, for exacerbations that do not respond adequately to bronchodilator therapy, a short course of systemic corticosteroid therapy may be needed to reverse the inflammation and speed recovery.

Pharmacists' Role in Asthma Management

Federal regulations (Omnibus Budget and Reconciliation Act 1990) of pharmacists receiving Federal funds and new regulations in many States require pharmacists to perform certain education and monitoring tasks. These regulations offer new opportunities for pharmacists to counsel patients. Pharmacists may have contact with patients with asthma who refill their prescriptions without routine physician care or who medicate themselves with over-the-counter (OTC) asthma products. As members of the health care team, pharmacists are in an excellent position to recognize patients who are not under the care of a physician or whose asthma may be poorly controlled for a variety of reasons. Pharmacists who recognize any of the criteria listed in table 1 (see page 3) can contact the patient's physician and can advise patients without regular physician care to seek medical care.

Appropriate therapy and patient adherence will prevent most emergency department visits and hospitalizations for asthma. However, when ED visits or hospitalizations occur, they provide an opportunity for pharmacists to ask about the patient's treatment plan and to reinforce and clarify instructions that will help prevent the problem from recurring.

Action Plan for Pharmacists

1. Educate patients about asthma medications.
2. Instruct patients about the proper techniques for inhaling medications.
3. Monitor medication use and refill intervals to help identify patients with poorly controlled asthma.
4. Encourage patients purchasing OTC asthma inhalers or tablets to seek medical care.
5. Help patients use peak flow meters appropriately.
6. Help patients discharged from the hospital understand their asthma management plan.

Action Plan for Pharmacists

There are numerous areas where pharmacists can contribute to improving health outcomes in patients with asthma. Pharmacists can:

1. Educate patients about the role of each medication.

Pharmacists can help patients understand that, with appropriate therapy, most patients can lead normal, productive, and physically active lives. Pharmacists can educate patients about the two broad categories of asthma medications:

Medications used to *prevent and/or decrease the frequency* of symptoms. Preventive medication should be taken on a regular basis even when the patient is free of symptoms. This type of long-term medication includes inhaled anti-inflammatory agents such as corticosteroids, cromolyn, and nedocromil, which are preferred therapy. It may include extended-release formulations of theophylline. Also included as long-term medication are extended-release oral and long-acting inhaled beta$_2$-agonists, which are added to inhaled corticosteroids when the recommended doses of inhaled corticosteroids are not sufficient to control chronic symptoms, especially nighttime symptoms. Preventive long-term medication also may include, for severe asthma, alternate day oral corticosteroid therapy. In addition, the use of a short- or long-acting inhaled beta$_2$-agonist or cromolyn before exercise to prevent exercise-induced bronchospasm falls into the "prevention" category.

Medications taken to *relieve* asthma symptoms. Medications in this category are designed to relieve symptoms and generally are prescribed to be taken only as needed (PRN). This therapy includes primarily short-acting inhaled beta$_2$-agonists (albuterol, bitolterol, pirbuterol, or terbutaline). In addition, a short course of oral corticosteroids for patients who are not fully responsive to inhaled bronchodilators may be used to treat acute exacerbations of asthma.

An effective asthma management plan should ensure that the patient is given written and verbal instructions that describe *when* and *how* a medication should be taken, *how much* to take, *how* to evaluate the response to therapy, *when* to seek medical care, and *what* to do when the desired effect is not achieved or side effects are encountered. Pharmacists can reinforce these instructions by reminding patients, for example, to contact their physician when acute symptoms are not relieved by using their short-acting beta$_2$-agonist inhaler as directed or when their peak expiratory flow rate (PEFR) drops below a predetermined value.

2. Instruct patients about the proper techniques for inhaling medications.

Inhaled medications are preferred over oral therapies. However, a major limitation in their effectiveness is the patient's ability to use the device appropriately.[5] Studies suggest that members of the health care team (e.g., physicians, nurses, and pharmacists) may not adequately instruct patients

Table 1

Signs of Poorly Controlled Asthma

Any one of the following criteria may indicate the need for medication adjustment, improved medication administration technique, or patient education concerning asthma and its management:

- Adverse effects from medications.
- Waking up at night from symptoms of asthma more than twice a month.
- Increased use of inhaled, short-acting beta$_2$-agonists (e.g., more than three to four times in 1 day).
- Long-term overuse of inhaled, short-acting beta$_2$-agonists (e.g., refilling the prescription more often than one canister/month or more than one canister/2 months of a short-acting agent when it is used in addition to a long-acting agent).
- Overuse or misuse of inhaled long-acting beta$_2$-agonists.
- Nonadherence to anti-inflammatory medications (e.g., refilling the prescription less than half as often as would be required if the directions on the prescription were followed).
- Failure to achieve quick and sustained response (i.e., beginning within 10 to 20 minutes and lasting longer than 3 to 4 hours) to short-acting beta$_2$-agonists during an acute asthma episode (as measured by a decrease in symptoms or an increase in peak expiratory flow rate).
- Poor tolerance to physical activity (i.e., the patient experiences symptoms of exercise-induced asthma).
- Missing school or work because of asthma symptoms.
- An emergency department visit or hospitalization for asthma.

on how to use a metered-dose inhaler (MDI).[6] Improper MDI technique can be one cause of a poor response to therapy. Pharmacists can play an important role on the health care team by teaching patients with asthma about proper medication technique. Figure 1 presents helpful tips for instruction on MDI techniques. Other devices, such as dry powder inhalers, breath-actuated inhalers, and nebulizers, are also available, and they require different techniques for administration. A placebo inhaler, which can be obtained from pharmaceutical manufacturers, and instructional videos may be useful in demonstrating proper technique.

Patients using inhalation therapies need careful instruction, including step-by-step demonstration at the time of dispensing the medication, and observation of their technique. Because inhaler technique tends to decline without routine review,[7] pharmacists should reassess a patient's technique when prescriptions are refilled or renewed. Patients should be reminded that the most important steps in a proper MDI technique are gentle exhalation before breathing in, a slow inhalation, and holding the breath.[8]

Pharmacists also should assess whether using a valved spacer device with an MDI would be helpful. Spacers may be beneficial to any patient, but they are indicated especially for the patient who cannot master the optimal inhaler technique. Spacers are routinely indicated for most patients using a corticosteroid MDI because they improve particle deposition in the lungs and decrease local side effects such as thrush and hoarseness. In children too young to use an MDI attached to a spacer device, a compressed air-driven nebulizer can be used to administer medications.

3. Monitor medication use and refill intervals to help identify patients with poorly controlled asthma.

During symptomatic periods, selective short-acting inhaled $beta_2$-agonists may be sufficient to relieve asthma symptoms. When asthma is stable, it is preferable to use these agents on an as-needed basis. Overuse and overreliance on short-acting inhaled $beta_2$-agonists can be signs that asthma is poorly controlled. During an exacerbation, patients may increase the dose and/or frequency of use, which may lead to a delay in seeking appropriate medical care.

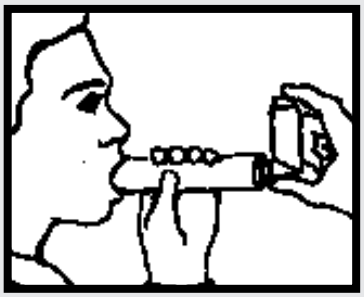
Pharmacists may find indications of chronic overuse of short-acting inhaled $beta_2$-agonists by checking patients' medical history and the frequency of refills.[9] Overuse can be defined as using more than one canister per month of a short- or long-acting $beta_2$-agonist or more than one canister of a short-acting $beta_2$-agonist in 2 months when used in conjunction with a long-acting agent. Pharmacists should also monitor for overuse of a long-acting $beta_2$-agonist (e.g., salmeterol). In general, these agents should not be used more than twice a day and are not appropriate to relieve acute symptoms.

Figure 1

Steps for Using the Inhaler

1. Remove the cap and hold inhaler upright.
2. Shake the inhaler.
3. Tilt head back slightly and breathe out.
4. Position the inhaler in one of the following ways (A is optimal, but C is acceptable for those who have difficulty with A or B):

A. Open mouth with inhaler 1-2 inches away



B. Use spacer (this is recommended especially for young children)

C. In the mouth

5. Press down on inhaler to release medication as you start to breathe in slowly.
6. Breathe in slowly (3-5 seconds).
7. Hold breath for 10 seconds to allow medicine to reach deeply into lungs.
8. Repeat puffs as directed. Waiting 1 minute between puffs may permit second puff to penetrate the lungs better.
9. Spacers are useful for all patients. They are particularly recommended for young children and older adults and for use with inhaled steroids.

* Note: Inhaled dry powder capsules require a different inhalation technique. To use a dry powder inhaler, it is important to close the mouth tightly around the mouthpiece of the inhaler and to inhale rapidly.

If overuse is noted, pharmacists should alert the physician, who can assess the need for reevaluation of the patient and consider whether the patient needs to initiate or intensify anti-inflammatory therapy. Before contacting the physician, pharmacists should have the patient demonstrate his or her MDI technique. Poor technique may be one of the causes of overuse of an MDI. The physician will find this information useful in making a decision on how to respond to the situation. Physicians also may want to evaluate recent trends in peak flow meter readings.

Physicians will consider several factors when deciding whether to initiate or increase anti-inflammatory therapy. In general, a short course of oral corticosteroids may be indicated if the excessive use of an MDI is (1) short term; (2) due to an acute, severe episode; or (3) the result of an isolated exacerbation caused by a common cold or other upper respiratory tract infections. The initiation or dose increase of an inhaled anti-inflammatory agent (corticosteroids, cromolyn, or nedocromil) as long-term therapy may be indicated if the patient relies on short-acting inhaled $beta_2$-agonists daily to relieve symptoms, has frequent fluctuations in the peak expiratory flow rate, or has other signs of poorly controlled asthma (table 1).

Patients on preventive therapy for asthma also should be monitored for signs of nonadherence to anti-inflammatory therapy. In some cases, patients do not adhere to anti-inflammatory therapy because they do not understand the purpose of or perceive any immediate benefit from this therapy. Some patients may be discouraged about following their prescribed regimen because they fear adverse reactions to the medications. Refilling the prescription at intervals longer than indicated by the directions for use on the prescription may indicate nonadherence. For example, if an inhaled anti-inflammatory agent contains 100 puffs and the directions are to take 2 puffs twice a day, a patient refilling the prescription once every 60 days is underusing the medication. In this example, the canister should be depleted in 25 days (100 puffs ÷ 4 puffs/day = 25 days).

4. Encourage patients purchasing OTC asthma inhalers or tablets to seek medical care.

Asthma is one of the very few potentially fatal diseases for which OTC products are available for self-treatment. Use of OTC inhalers may lead to a delay in seeking appropriate medical care. Pharmacists should refer anyone using an OTC product for respiratory symptoms to a physician for diagnosis, regular monitoring, and proper treatment. The physician can then determine the need for other therapies, such as an inhaled anti-inflammatory agent to prevent symptoms.

Over-the-counter inhalers contain epinephrine, which is a nonselective, weak, and extremely short-acting bronchodilator. Thus, if physicians determine that the PRN use of an inhaled bron-

chodilator is indicated, they can prescribe a selective short-acting inhaled beta$_2$-agonist that will provide greater efficacy and a longer duration of action. Oral OTC asthma medications contain ephedrine or a combination of ephedrine and theophylline. Generally, bronchodilators are less effective and cause more side effects when administered by the oral route,[10] and combinations of theophylline and ephedrine have the potential to cause synergistic toxicity.[11]

5. Help patients use peak flow meters appropriately.

It is recommended that clinicians consider peak expiratory flow rate monitoring for patients over 5 years of age with moderate or severe asthma. Regular home monitoring may detect decreased lung function and signs of an impending asthma episode before it becomes more severe. The PEFR is the greatest flow velocity that can be obtained during a forced expiration starting with fully inflated lungs. It provides a simple, quantitative, and reproducible measure of airway obstruction with a relatively inexpensive device that is available without a prescription.

Measuring PEFR in a patient with asthma is analogous to measuring blood pressure with a sphygmomanometer or blood glucose to guide insulin dosage. The PEFR is used by the physician to assess the severity of asthma as a basis for adding medication, monitoring response to chronic therapy, and detecting deterioration in lung function before symptoms develop. The physician may consider more aggressive therapy if the patient's highest value is less than 80 percent of predicted value and/or daily variability is more than 20 percent.

Pharmacists should discuss the following items with patients: (1) the intended purpose of a peak flow meter and (2) how to use it and record the values. The patient's physician should develop an individualized plan for the use of the peak flow meter. The plan should include a threshold value and instructions on what the patient should do if the PEFR drops below this value (e.g., increase medication, call the physician, or seek emergency medical care).

6. Help patients discharged from the hospital after an asthma exacerbation understand their asthma management plan.

Every patient being discharged from the hospital for the treatment of acute asthma should receive and understand an individualized asthma management plan. An asthma management plan should include specific written instructions for patients and families (table 2). Hospital pharmacists can discuss such a plan with a patient before discharge, reinforcing and clarifying instructions that have been designed to prevent subsequent hospitalizations or emergency department visits. Pharmacists also can review the patient's inhaler and peak flow meter technique and provide instruction, if needed.

Summary

Our current understanding of the pathophysiology of asthma and the availability of potent, effective therapies mean that asthma can be well controlled. However, to achieve this goal, optimal therapy must be prescribed and the patient must be taught how and when to use it. Pharmacists, as part of the health care team, help improve the pharmacologic management of asthma by teaching patients about their medications, how to use them, and the importance of using them as prescribed. Alerting physicians to suspected problems, such as underusing anti-inflammatory therapy or overusing inhaled bronchodilators, will provide an opportunity for the physician to consider changes in a patient's management plan when appropriate. Acting in these educational and information-sharing roles, pharmacists contribute to improving the control of asthma and enabling patients to live full, active, and productive lives.

Table 2

Written Guidelines for Patients and Families

Written guidelines should include the following points:

- Specific instructions about use of medications, including dose, frequency of administration, guidelines for changing dose or adding medications if appropriate, and adverse effects to report to the clinician.
- The importance of long-term preventive medications.
- How to monitor body signs or symptoms and/or PEFR to detect increasing airflow obstruction as early as possible; early signs of airflow obstruction vary according to the individual and should be identified for each patient.
- Criteria for initiating or modifying treatment: a drop in PEFR or early signs or symptoms.
- List of steps to take in managing an acute asthma episode (i.e., remove the precipitating trigger, give medication, avoid strenuous physical activity, and keep patient and family calm).
- Specific criteria for seeking emergency medical care, including a pattern of declining PEFR; failure of medications at home to control worsening symptoms; difficulty in breathing (wheeze may be absent), walking, or talking; intercostal retractions; blue fingernails or lips.
- Observable signs that long-term therapy is less than optimal, such as asthma symptoms that cause sleep interruption, consistently low or highly variable PEFR, and/or too frequent use of short-acting inhaled beta$_2$-agonists. Such signs should be promptly discussed with the clinician.

References

1. National Center for Health Statistics. Current estimates from the National Health Interview Survey: United States. *Vital and Health Statistics.* Series 10. Washington, D.C. U.S. Government Printing Office. Issues from 1985-1993.
2. Weiss KB, Gergen PJ, Hodgson TA. An economic evaluation of asthma in the United States. *New England Journal of Medicine* 1992; 326:862-6.
3. Asthma—United States: 1980-90. *Morbidity and Mortality Weekly Report* 1992; 41:733-5.
4. National Heart, Lung, and Blood Institute, National Asthma Education Program, Expert Panel Report. *Guidelines for the Diagnosis and Management of Asthma.* NIH Publication No. 91-3042, August 1991.
5. Self TH, Brooks JB, Lieberman P, Ryan MR. The value of demonstration and role of the pharmacist in teaching current use of pressurized bronchodilators. *Canadian Medical Association Journal* 1983; 128:129-31.
6. Kesten S, Zive K, Chapman KR. Pharmacist knowledge and ability to use inhaled medication delivery systems. *Chest* 1993; 104:1737-42.
7. De Blaquiere P, Christensen DB, Carter WB, Martin TR. Use and misuse of metered-dose inhalers by patients with chronic lung disease. *American Review of Respiratory Diseases* 1989; 140:910-6.
8. Hindle M, Newton DA, Chrystyn H. Investigations of an optimal inhaler technique with the use of urinary salbutamol excretion as a measure of relative bioavailability to the lung. *Thorax* 1993; 48(6):607-10.
9. Executive Committee, American Academy of Allergy and Immunology. Inhaled beta-adrenergic agonists in asthma. *Journal of Allergy and Clinical Immunology* 1993; 91:1234-7.
10. Larsson S, Svedmyr N. Bronchodilating effect and side effects of beta$_2$-adrenoceptor stimulants by different modes of administration (tablets, metered aerosol, and combinations thereof). *American Review of Respiratory Diseases* 1977; 116:861-9.
11. Weinberger M, Bronsky E. Interaction of ephedrine and theophylline. *Clinical Pharmacology and Therapeutics* 1975; 17:585-92.

Resources

The following publications are available from the National Asthma Education and Prevention Program (NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; Telephone 301-251-1222):

Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma (Executive Summary) (1991) — A summary presentation of the latest asthma management guidelines from the National Asthma Education and Prevention Program.

Asthma Management Kit for Clinicians (1992) — Containing "Teach Your Patients About Asthma: A Clinician's Guide," a poster, peak flow meter standards, "Your Asthma Can Be Controlled: Expect Nothing Less," and "Check Your Asthma 'I.Q.'"

Check Your Asthma "I.Q." (1990) — An asthma quiz that can be used as a simple pretest or posttest tool to measure client knowledge about asthma. (2 pages)

Facts About Asthma (1990) — An overview of asthma, the current theory on asthma medications, asthma triggers, and the need for chronic — not episodic — care of asthma. (8 pages) Available in English and Spanish.

Teach Your Patients About Asthma: A Clinician's Guide (1992) — A three-part patient education guide that includes teaching notes and worksheets. This publication is designed to help clinicians teach adults and children with asthma and parents of children with asthma about the disease and its management. (98 pages)

Your Asthma Can Be Controlled: Expect Nothing Less (1991) — A pamphlet for patients with asthma that explains how patients can become active partners with their doctors in asthma management. (20 pages)