

# Asthma Management and the Allergist

Better Outcomes  
at Lower Cost

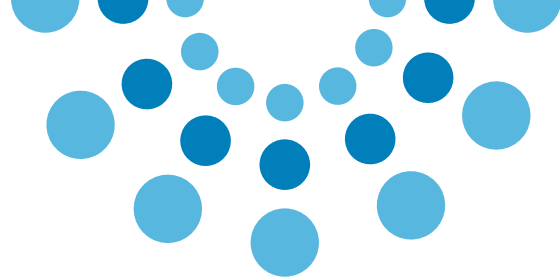


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Editors: Bradley E. Chipps, MD and Michael B. Foggs, MD

Reviewed by Leonard Bielory, MD, Tao Le, MD,  
Stanley M. Fineman, MD and Stephen A. Tilles, MD



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## Summary

● It's been nearly 15 years since the U.S. Department of Health and Human Services declared asthma an epidemic and made the disease a priority of its Healthy People objectives in a call for *Action Against Asthma*, a strategic plan to tackle the growing public health threat of asthma. [1] At about the same time, the CDC created the National Asthma Control Program [2] and asthma management increasingly became a model for new strategies in managed care.

Yet despite these efforts and significant advances in the diagnosis, treatment and overall management of asthma, prevalence of the disease has increased significantly over the years and vast numbers of asthma patients – including a disproportionate number of children – do not receive adequate care to control asthma and its debilitating symptoms.

Asthma is among the most common of adult chronic diseases, and the most common among children. It also is one of the most difficult to manage – and **mismanagement comes at a high price** in terms of both patient suffering and health care costs. It's been estimated that 80 percent of all resources expended for asthma treatment are spent on 20 percent of patients whose disease is not controlled. [3]

When managed aggressively by a specialist, asthma does not have to be a life-threatening or disabling disease. **The condition can be controlled so that acute asthma attacks are avoided in most patients.** Curbing the asthma epidemic, preventing needless suffering and premature deaths, and controlling runaway costs of treating the disease continue to be priorities for the nation's health care policymakers and allergists.

As asthma specialists, allergists have consistently led the way in advancing asthma management and demonstrating in practice that they provide high-quality, cost-effective asthma care. **Asthma patients under the care of an allergist consistently experience better outcomes at lower cost because of:**

- Fewer emergency care visits
- Fewer hospitalizations
- Reduced lengths of hospital stays
- Fewer sick care office visits
- Fewer days missed from work or school
- Increased productivity in their work and personal lives
- Greater satisfaction with their care
- An improved quality of life

This report reviews the current state of asthma care, its economic consequences, widely accepted standards of care and numerous studies that demonstrate the superior outcomes of allergist-provided care. Detailed abstracts on the outcomes and cost studies cited are included as an appendix to this document.

## Scope and Impact of the Asthma Epidemic



### Asthma in America

Prevalence is at an all-time high (8.4 percent)

Affects 26 million people, including 7 million children

Costs \$56 billion/year

More than 15.3 million physician office and hospital outpatient department visits

1.75 million emergency department (ED) visits

Almost a half million hospitalizations, including 157,000 for children 17 and under

14.2 million lost work days

10.5 million lost school days

Sources: Centers for Disease Control and Prevention, National Institutes of Health

- In the United States, prevalence of asthma grew from 7.3 percent in 2001 to 8.4 percent in 2010, **and is now at its highest level.** [4]

Asthma afflicts 300 million people worldwide, including nearly 26 million in the U.S. Of those affected, 7 million are children. More than 3,400 people die of the disease each year, nearly half of whom are age 65 or older. Recent statistics show that half of people with asthma have at least one asthma attack each year, with children (57 percent) more likely to have an attack than adults (51 percent). [5-6]

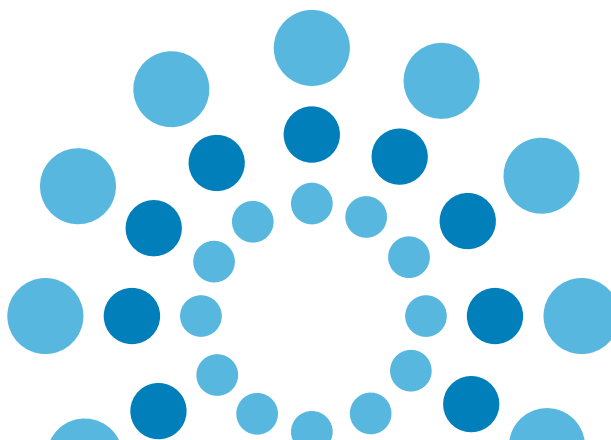
Asthma prevalence is higher in children (9.4 percent) than in adults (7.7 percent), and higher in females (9.2 percent) than males (7.0 percent). The disease disproportionately affects blacks (11.2 percent) compared to whites (7.7 percent), and is more prevalent among the poor. It's also more prevalent among persons with a family income below 100 percent of the federal poverty threshold (11.2 percent). [5]

**Much of the expense of asthma is attributed to costs that can be avoided or reduced when the disease is controlled.** Current data shows that annually asthma accounts for:

- More than 15.3 million physician office and hospital outpatient department visits
- 1.75 million emergency department (ED) visits
- Almost a half million hospitalizations, including 157,000 for children 17 and under
- 14.2 million lost work days
- 10.5 million lost school days [4]

The most recent analysis of the Medical Expenditure Panel Survey (2002 – 2007) found the incremental **direct cost of asthma is \$3,259 (in 2009 dollars) per person per year.** The value of additional days lost attributable to asthma per year was approximately \$301 for each worker and \$93 for each student. **The total annual cost of asthma to society was \$56 billion,** with productivity losses due to morbidity and mortality accounting for \$5.9 billion. [7]

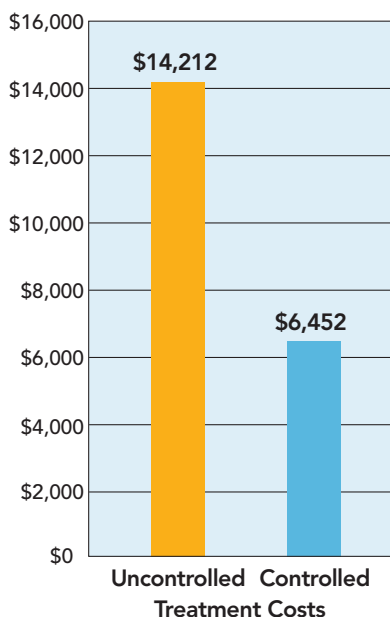
Similar results have been seen in earlier studies, with one [8] estimating costs for severe, uncontrolled asthma at nearly five times that for mild asthma in an adult population; another data analysis concluded the economic impact of asthma on school-age children is “immense.” [9].



## Aggressive Asthma Management: The Standard of Care



### Costs Are Highest When Asthma is Uncontrolled



Source: Sullivan, et al. Allergy 2007

● In response to the alarming increase in the prevalence and cost of asthma, an expert panel was convened by the NIH National Heart, Lung and Blood Institute (NHLBI) in 1991 to develop consensus guidelines for the care of asthma patients. The guidelines have been updated as new best practice evidence becomes available; the most recent update was in 2007. Based on the best clinical evidence, the guidelines place special emphasis on the importance of asthma control, a stepwise approach to asthma management, and early diagnosis and intervention. [10]

A primary objective of the 2007 guidelines is educating patients and physicians about new standards of care for treating asthma, and the special training, clinical expertise and support services required to control the disease.

Until the first NIH guidelines were developed, it was the consensus of physicians that asthma therapy should be conservative and medications introduced one at a time, with dosage increases only when the condition worsened. But evidence-based medicine has proven otherwise. Current guidelines stipulate that **asthma should be diagnosed as early as possible and treated aggressively while it is still mild**. Otherwise it may worsen, requiring even more expensive medical interventions and, in some cases, cause permanent scarring and irreversible remodeling of the lungs' airways. [10]

Asthma cannot be cured, but it can be controlled. According to the NIH Expert Panel, when guidelines are followed people with asthma should expect:

- no or few asthma symptoms, even at night or after exercise
- prevention of all or most asthma attacks
- participation in all activities, including exercise
- no emergency room visits or hospital stays
- less need for quick-relief medicines
- no or few side effects from asthma medicines

The disease should be treated with multiple medications if necessary to control symptoms as soon as they appear. **Allergists, with their extensive experience using these medications and understanding of the complexities of asthma, are able to prescribe them properly according to the subtype of asthma diagnosed and other needs of the individual patient.**

Aggressive therapy should be initiated at the onset to establish immediate control of symptoms. The therapy then may be stepped down as the patient's condition improves. An allergy history, physical exam and skin tests may be needed to identify factors triggering asthma exacerbations. The aggressive therapy recommended in the NIH Guidelines also includes ongoing and frequent interactions with medical personnel to **monitor the disease, develop written treatment plans and provide education and support services.**

Although the costs of the initial therapy may be higher, these measures have been shown to control the disease over the long term and prevent or significantly decrease the frequency of acute asthma attacks and the high costs of emergency room care, hospitalization, frequent physician interventions and time lost from work, school or other activities. Numerous studies show that **initial costs are outweighed by significant long-term health benefits and cost savings.**



Every dollar spent on asthma control programs can save \$71 in health care expenses by shifting care from costly hospital/emergency department settings to doctor offices and outpatient clinics.

Source: National Asthma Control Program: An Investment in America's Health. Centers for Disease Control and Prevention. 2013.

For example, one large study of patients enrolled in a managed care plan found that the best managers of asthma are specialists who are more likely to follow consensus guidelines for diagnostics, therapies and the allocation of time to counsel the patient. The study found that the costs of care were about the same or less than the care given by non-specialists, and outcomes and disease control were significantly improved for the patients treated by specialists. [11]

### Compliance with Guidelines Remains Poor

Unfortunately, more than 20 years after publication of the first NIH Guidelines, a majority of today's patients continue to receive substandard care. Too often asthma patients receive health care services from providers who have little specialized training or knowledge of recent advances in asthma disease management. Many outdated approaches to asthma treatment are still practiced.

An analysis of Medical Expenditure Panel Surveys of more than 100,000 people conducted from 2008 to 2010 concluded that improvement of **asthma control continues to be a U.S. public health concern**. Results suggest suboptimal asthma control with underuse of long-term control medications, overuse of quick-relief inhalers, and a significant number of self-reported asthma exacerbations. [12]

U.S.-specific data from the Global Asthma Physician and Patient (GAPP) survey also found a lack of asthma control, poor adherence to therapy, and room for improvement in patient/physician communication and partnership in treating asthma. Among adults surveyed, 64 percent were being treated by a primary care provider, 15 percent by specialists and 21 percent were not being treated by any physician or health care professional. [13]

Poor asthma control also was shown in the multicenter Epidemiology and Natural History of Asthma Outcome and Treatment Regimens (TENOR) study of patients with severe or difficult-to-treat asthma. The study found that 83 percent of nearly 4,000 patients had uncontrolled asthma, 16 percent had inconsistent control and only 1.3 percent were controlled. **Costs for uncontrolled patients were more than double those of controlled patients** throughout the study. [14]

Asthma was uncontrolled in 85 percent of inner-city students with asthma in Little Rock, Ark. [15], and a large study of Medicaid recipients with asthma in Kentucky found that failure to adhere to NIH Guidelines was prevalent and associated with an increase in exacerbations of asthma that resulted in hospitalizations. [16]

In another study sponsored by the Asthma and Allergy Foundation of America, a 54 percent increase in the cost of asthma care reflected a steep rise in medication costs, yet nine out of 10 prescriptions were for quick-relief "rescue" medications to manage severe asthma attacks, rather than for inhaled corticosteroids used to prevent attacks. The study's authors concluded that many patients were not being treated according to established guidelines. [17]

## When to Refer to an Allergist



- According to the NIH Guidelines [10], patients should be referred to a specialist if they:
  - have asthma symptoms every day and often at night that cause them to limit their activities
  - have had a life-threatening asthma attack
  - do not meet the goals of asthma treatment after three to six months, or their doctor believes they are not responding to current treatment
  - have symptoms that are unusual or hard to diagnose
  - have co-existing conditions such as severe allergic rhinitis (“hay fever”) or sinusitis that complicate asthma or its diagnosis
  - need more tests to find out more about their asthma and the causes of symptoms
  - need more help and instruction on treatment plans, medicines or asthma triggers
  - are being considered for immunotherapy, or “allergy shots,” which also can be administered orally
  - need oral corticosteroid therapy or high-dose inhaled corticosteroids
  - have taken oral corticosteroids more than twice in one year
  - have been admitted to a hospital because of asthma
  - need to identify asthma triggers
  - require confirmation of occupational or environmental substances that may be provoking or contributing to asthma

An asthma specialist also is recommended for children ages 0-4 who have asthma symptoms every day and three to four nights or more a month. Seeing a specialist also should be considered for children who have symptoms three days or more a week and one to two nights a month.

The NIH Guidelines for referral to an asthma specialist are in general accord with recommendations of the American College of Allergy, Asthma & Immunology (ACAAI), the American Academy of Allergy, Asthma & Immunology (AAAAI) and the Joint Council of Allergy, Asthma & Immunology (JCAAI), and are endorsed by the Allergy-Immunology Subsection of the American Academy of Pediatrics (AAP).

The recommendations of these professional medical societies further state that referral to a specialist is indicated when:

- the diagnosis of asthma is in doubt
- the patient asks for a consultation

The 2014 guidelines of the Global Initiative for Asthma (GINA) [18] recommend referral to a specialist for:

- difficulty in confirming the diagnosis of asthma
- suspected occupational asthma
- persistent uncontrolled asthma or frequent exacerbations
- any risk factor for asthma-related death
- evidence of, or risk of, significant treatment side effects
- symptoms suggesting complications or sub-types of asthma
- asthma combined with confirmed food allergy in children

  
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## Asthma Treatment Outcomes with Specialist Care

A large survey of national health care data identified two major trends inconsistent with asthma best practices:

Overuse of rescue medications (up to 60%)

Underuse of preventive medicine (70%)

Both are strongly associated with poor disease control, risk for an “asthma attack” and high treatment costs.

Source: Slejko, et al. JACI. 2014.

### Despite this consensus of experts, the referral pattern of general practice and primary care physicians is frequently not in accord with guidelines.

A survey of 407 pediatricians and family physicians found that their criteria for referral to an asthma specialist did not conform to the NIH Guidelines. [19] Another study of primary care physicians found that the likelihood of appropriate referral depended on whether the physician had taken a rotation in allergy/immunology during training. Among those who had some training in allergic diseases such as asthma, nearly 78 percent had referred patients to an allergist, compared with 46 percent who were less educated about allergic conditions. [20]

- With their years of specialty training and clinical experience in asthma management, **allergists are more likely to follow the state-of-the-art treatment plans that improve outcomes and reduce costs, and are more likely than non-specialists to manage asthma based on the latest clinical study findings, to identify and implement procedures to reduce allergy triggers for the disease, and to follow consensus guidelines.** It is well documented that **asthma care delivered under the supervision of an allergist results in improved outcomes and more effective use of health care resources.** For example:
  - A study was conducted of more than 16,000 patients initiated on combination inhaled corticosteroid and long-acting  $\beta_2$ -adrenergic agonist (ICS/LABA) therapy, which is recommended for patients whose asthma is not controlled by other maintenance therapies and for those with moderate-to-severe asthma. Pharmaceuticals are a major driver of asthma care costs [8], yet only 39.2 percent of patients in the study met one or more criterion for appropriate use. Patients who were using the medication appropriately were significantly more likely to be treated by specialists than by family medicine/general practitioners. [21]
  - The ratio of controller medication to total asthma medications was analyzed for 38,000 individuals with persistent asthma as defined by HEDIS measures. Higher ratios (an indicator of adherence) were seen in patients who had asthma specialists as their usual-care physician. The authors concluded that “provider knowledge and communication skills influence adherence to treatment, and **specialist providers may be better at communicating complex regimens to their patients with asthma.**” [22]
  - A survey of nearly 2,000 patients enrolled in 12 managed care organizations analyzed the relationship between physician specialty and treatment outcomes, using indicators from the NIH Guidelines as outcome measures. Asthma care provided by specialists was consistently associated with better patient outcomes across a range of relevant indicators compared to care provided by generalists, including fewer hospitalizations and emergency room visits, higher ratings for the quality of care, fewer restrictions in activities and improved physical functioning. [23]
  - A comparative evaluation of 301 worker’s compensation claimants with work-related asthma found that only 36.9 percent of the workers were treated by specialists and fewer than half received an objective evaluation of pulmonary function. Those treated by specialists were significantly more likely to have received appropriate diagnostic testing (82.9 percent) compared to those treated by generalists (20 percent). [24]



## Asthma and Allergies

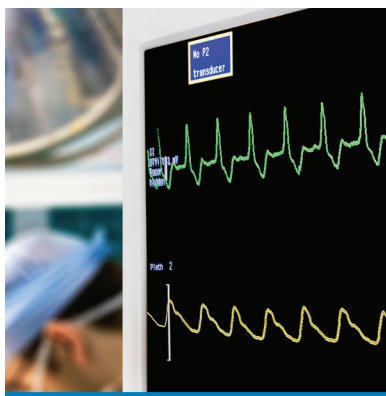
Allergen immunotherapy is distinguished from symptomatic drug treatments by its unique potential to alter the course of allergic disease and thereby mitigate progression to asthma.

Source: Hankin, et al. JACI. 2003

- In a random sample of 3,568 patients with persistent asthma enrolled in an HMO, patients who were treated by asthma specialists reported significantly higher general physical and asthma-specific quality of life, less asthma control problems, less severe symptoms, higher satisfaction with care and greater self-management knowledge compared with patients followed by primary care physicians. Patients of allergists were less likely to be hospitalized, have unscheduled visits for asthma care or to overuse beta-agonist medications. [25]
- In related studies, researchers found that effective management strategies are associated with appropriate medication use and better outcomes, even after accounting for high-risk characteristics. In these studies, asthma specialist care was independently associated with better disease control. [26-29]
- A survey of parents of 1,648 Medicaid-insured children with asthma enrolled in five managed care plans found widespread underuse of controller medications. Treatment by an allergist was associated with more appropriate use of these medications. [30]
- A study of more than 2,300 children with asthma in the Massachusetts Medicaid program found that children in a staff-model health maintenance organization (HMO) were nearly twice as likely to receive specialist care as those in a state-administered primary care case manager plan. Children in the HMO were 54 percent less likely to require an emergency department visit or hospitalization, half as likely to meet national definitions for persistent asthma and nearly three times more likely to receive timely follow-up care compared to children in the primary care plan. [31]
- A large matched cohort study of Florida Medicaid claims compared health care costs for children treated with allergen immunotherapy (AIT) for allergic rhinitis (AR), a predisposing risk factor for asthma, with those who did not receive AIT. Even after matching groups by the presence of AR-related asthma, patients in the immunotherapy-treated group incurred an average of 33 percent (\$1,625) lower 18-month median per patient overall health care costs; 29 percent (\$765) to 58 percent (\$1,519) lower outpatient costs; and 16 percent (\$208) lower pharmacy costs after initiation of AIT. These significant reductions were evident as early as three months after immunotherapy began and increased during the 18-month follow-up period. [32]

Many of the studies demonstrating improved outcomes with allergist care were conducted by HMOs or other managed care plans. Because of the consistent findings of the benefits of specialty care, administrators of many health care plans and managed care organizations strive to involve allergists in asthma care.

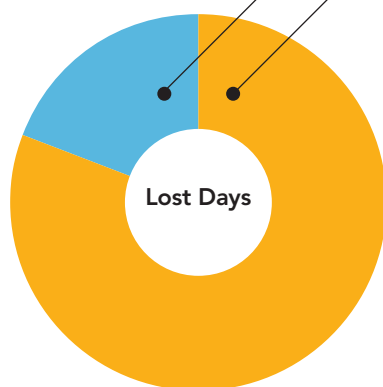
## Use of Health Care Resources and Asthma Treatment Costs with Specialist Care



### Lost Work/School Days Due to Asthma

Non-Specialist Care: 1,040

Specialist Care: 246



**77% reduction in time lost from work or school with asthma specialty care**

Source: Castro, et al. *Am J Resp Critical Care Med.* 2003

● Numerous studies have shown that aggressive management and treatment of asthma according to consensus guidelines not only produces better health outcomes, but also can reduce the use of health care resources and costs related to the disease.

Even when asthma patients attend frequent clinic programs offering intensive specialty services, costs are saved in the long-term by reducing the number of emergency room visits and other acute care interventions.

- In one center, significant savings were realized among patients who made frequent, regular visits to a comprehensive allergy clinic, compared to patients who went less frequently to an emergency room for treatment of acute asthma symptoms, [33] and one large, urban specialty asthma center estimated that comprehensive specialty care reduced insurance claims for asthma-related services by 45 percent to 80 percent. [34]
- In a comprehensive asthma program for 25 pediatric patients whose care included home environmental assessment and case management supervised by asthma specialists, emergency room visits decreased from 47 to 18; hospitalizations from 22 to 3 and clinic visits from 279 to 172. [35]
- A four-year outcome study of drop-in group medical appointments that allowed patients to interact with an allergist and other asthma specialists consistently met treatment goals as described by National Asthma Education and Prevention Program (NAEPP) Guidelines, including those for control of asthma symptoms, prevention of exacerbations, activity levels and patient satisfaction. [36]
- The effective management of asthma is complex, and requires effective provider/patient collaboration and communication. The NIH Guidelines recommend that providers prepare a treatment plan for each patient that details prescribed daily management (including medications and environmental control strategies) and how to recognize and control asthma exacerbations. In one study of 324 women, those with treatment plans were more likely to see an asthma specialist, be more satisfied with their care and report medication adherence compared to those without a plan. [37]

Other research has documented that the services in specialty clinics result in a higher quality of care, including strategies to help patients control their disease and reduce the incidence of acute symptoms that require hospitalization or emergency room services. [38]

### Hospitalizations

There are nearly one-half million hospitalizations for asthma each year, with an average per-patient length of stay of 4.3 days. [4] Yet there is overwhelming evidence that many hospitalizations for asthma can be avoided when patients receive specialist care.

- In a Washington University School of Medicine study, nearly 100 adults hospitalized for asthma and a history of frequent health care use were randomized to receive specialty care or general care for six months. There was a 60 percent reduction in hospitalizations in the group receiving specialty care, and readmissions for asthma were reduced by 54 percent. [39]

- In other studies, care coordinated through an asthma center by a multispecialty team of experts resulted in an 89 percent decrease in hospital admissions among 125 patients with difficult-to-control asthma [40]; adults with moderate-to-severe asthma saw a 77 percent decrease in hospitalization after completing a course of outpatient treatment in a specialty asthma care center [34] and similar reductions in hospitalization and/or readmissions were seen when patients were evaluated by an allergist or enrolled in an intervention program supervised by asthma specialists. [39-42]



### Emergency Department Visits

Despite new therapies and medications that can prevent asthma attacks, many patients still seek emergency services to treat uncontrolled exacerbations of the disease. Each year, there are 1.75 million emergency department visits for asthma [4] and clinical studies document that emergency visits are frequently the result of poor asthma management. [27,43]

#### **Patients who are cared for by asthma specialists require fewer emergency room visits.**

- A study of 9,608 patients, ages 3 to 64 years, enrolled in a large HMO found that dispensing of seven or more canisters of inhaled controller medications combined with care by an asthma specialist were both independently associated with a lower risk of emergency asthma care. [27]
- In studies of children with asthma, emergency department use was significantly less among those who saw an allergist on a regular basis. [31,43]
- The average annual number of emergency department visits was 3.45 for each patient with severe asthma enrolled in a specialty allergy clinic, compared to 6.1 visits for patients who were not enrolled. [33] Other studies have confirmed that comprehensive treatment in a specialty allergy center reduces emergency visits and results in significant cost savings. [31,33-34]

### Sick Care Office Visits

Annually in America, about 15.3 million physician office and outpatient clinic visits are made for the treatment of asthma. [4] Supervision of care by an allergist can reduce the number of sick care office visits for asthma patients. A study of patients with moderate-to-severe asthma in a Kaiser Permanente health plan in Denver found sick care office visits were reduced by 45 percent in patients who received follow-up care by an allergist for at least one year. [41]

### Missed Days from Work or School

Aggressive management of asthma by an allergist also can reduce the estimated 14.2 million work days and 10.5 million school days missed each year because of asthma, which are estimated to cost society \$5.9 billion annually. [4]

- One study reported that adult patients averaged an 80 percent reduction in missed work days, and children had 65 percent fewer absent days from school after receiving care in a multidisciplinary asthma center. [34]



- When 100 adults who had a history of frequent health care were randomly assigned to receive either specialty care or general care for six months, the general care group has 1,040 days of lost work or school, compared to 246 days for those assigned to specialty care. [39]

### **Patient Satisfaction and Quality of Life**

Patients who receive asthma care from an allergist experience improved emotional and physical wellbeing, and are more satisfied with their physician and with the quality of their general medical care.

In a survey of nearly 400 patients treated in a large HMO, significant quality of life improvements were reported by patients treated by allergists, compared to those treated by generalists or in the emergency department. Improvements were seen in physical function, emotion, pain relief and general health. [44]

In a private practice, patients were surveyed after the initiation of an asthma management program that followed the NIH Guidelines and was supervised by an asthma specialist. The patients reported significant improvements in their ability to participate in activities, their emotional well-being and in the control of asthma symptoms. [45]

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## **How Allergists Achieve High-Quality, Cost-Effective Outcomes**

- Society in general, health plan administrators, group plan purchasers and – most importantly – patients benefit when asthma care is managed by an allergist. With their specialty training, knowledge and experience, allergists can:

### **Accurately diagnose the disease, its types, subtypes and severity**

The blockage of airways caused by asthma can be intermittent, so a patient with asthma may have symptoms of the disease and yet appear to have normal lung function during a routine physician visit. The allergist can perform specialized tests such as a methacholine or exercise challenge to determine if symptoms are due to asthma or to another medical condition.

### **Identify the role of external factors, including allergens that can trigger an asthma attack, and advise patients on how to avoid their asthma triggers**

Many people with asthma are allergic to one or more things that trigger their asthma symptoms. The allergist performs tests to identify an individual's asthma triggers and helps patients develop a plan to avoid or minimize exposure to the allergens that contribute to the disease.

### **Administer immunotherapy to reduce sensitivity to allergy triggers**

According to current NIH Guidelines, allergy immunotherapy is indicated for people with allergic asthma who:

- Have symptoms that are not adequately relieved by asthma medications
- Are unable to avoid the allergens that trigger their disease
- Have unacceptable side effects from asthma medications
- Have not responded well to asthma medications, or need to avoid long-term medication use.

In some cases, immunotherapy also can prevent children with nasal allergies or other risk factors from developing asthma.

**Use current best practice standards to develop and implement appropriate treatment plans that focus on asthma control**

The allergist understands that each patient with asthma is unique and requires a treatment plan tailored to individual needs. Allergists work with the patient to develop self-help plans that include at-home instructions for assessing asthma control, how to deal with asthma symptoms and when to seek help for an asthma attack.

**Maintain disease control through a multi-faceted approach that includes prevention, appropriate use of medications and other interventions to prevent symptoms; and promote ongoing patient education and self-care strategies**

The most successful asthma control results from a partnership between patient and physician. The allergist is uniquely qualified to work with patients to ensure proper use of long-term controller medications, avoid over-reliance on quick-relief medications and prevent the hospitalizations, emergency room visits, days lost from work or school and other debilitating and expensive outcomes associated with poorly controlled asthma.

**Prevent serious consequences of asthma**

For persons who have required emergency care or hospitalization for asthma, care by an allergist can reduce the need for these acute care services. Compared to care provided by general medical professionals, the allergist is more likely to educate the patient in self-management, including the use of written asthma action plans and of peak flow meters to enhance asthma control.

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## New Perspectives on Asthma

● As more is learned about asthma, researchers are discovering that the disease is far more complex than previously thought, with new data from genomics, epidemiology, in vitro studies and other research that is leading to new asthma management strategies. [46-47] Asthma consists of several subtypes, such as allergic asthma, exercise-induced asthma, asthma related to bacterial or fungal infections and asthma in the elderly. Each type can have different symptoms or triggers, and each requires a different approach to diagnosis and treatment. New guidelines for the definition, evaluation and treatment of severe asthma released in 2014 by a Task Force of the European Respiratory Society (ERS)/American Thoracic Society (ATS), note that severe asthma is a heterogeneous condition consisting of phenotypes. They recommend specialist care throughout the evaluation and treatment of severe asthma to improve outcomes, reduce costs and avoid the misdiagnosis of non-asthmatic conditions as asthma, which is estimated to be as high as 12 to 30 percent. [47] Allergists, based on extensive experience in treating all forms of the disease, understand its complexities and know that it is crucial to distinguish among different types. They can assess the severity of each case and develop case-specific action plans that have the greatest likelihood of success with individual patients.



## The Emerging Role of New Treatments and Preventions

Allergists are qualified to ensure that patients have access to the latest strategies to keep their asthma controlled, and have the training and clinical experience to deal effectively with factors such as the relationship between environmental pollutants and allergens, as well as the mechanisms of allergic reactions.

### Allergists:

- promote asthma self-management skills to assist people in eliminating or decreasing exposure to asthma “triggers.” [48]
- are more likely than generalists to provide authoritative information to health care providers, families and other caregivers. [16, 49-50]
- are specialists at immunotherapy that can reduce sensitivity to the allergens that trigger asthma attacks, and significantly reduce the severity of the disease [47, 51] or prevent the development of asthma in some children with seasonal allergies. [32,52]

Allergists are involved in clinical trials to test other promising techniques, such as the use of monoclonal antibodies to inhibit the inflammatory process that leads to asthma. They usually are the first clinicians to become aware of and implement proven new treatments.

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## Asthma Specialty Care in Health Plans

● Asthma management remains a high national priority and the National Committee for Quality Assurance (NCQA) has made the appropriate use of asthma medications a key indicator in evaluating the quality of managed care programs. [53] Under the Affordable Care Act, asthma and allergy screenings and tests must be covered under all plans at no cost to the patient, and insurers may not apply conditional or chronic limits on asthma care. As asthma management becomes more sophisticated and as payers, regulatory agencies and patient advocates collect and report data on performance, health care plans with a demonstrable record of successfully managing asthma can expect preferential referrals. Plans with goals of reducing participant turnover and that emphasize lifestyle change are most successful at satisfying patients and reducing costs.

**Allergists can and should be part of the process of transformation in our health care system.** They can be integral to helping ACOs and other value-based care models save money by reducing hospitalizations and improving the quality of allergy and asthma care in the populations served. [54]



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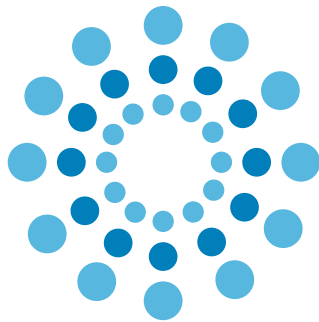
## Conclusion

- A substantial and growing body of published clinical data and economic research shows significant differences in treatment outcomes and costs between asthma care that is managed by generalists, who have no specialty training in the complexities of asthma, and disease management that is under the direction of an allergist.

An evidence-based review of the literature indicates that aggressive management of asthma by specialists improves outcomes for patients, lowers overall treatment costs for payers, and reduces the indirect costs to society. Specialty care results in fewer hospitalizations and other emergency interventions, fewer missed days from work or school, and significantly enhanced health and quality of life for those who suffer from asthma.

Despite all this, some health care plans today still place obstacles in front of patients seeking referral to an asthma specialist, even when referral to a specialist is recommended in the NIH Guidelines and other national consensus recommendations. The result is inadequate or sporadic treatment that allows disease progression, airway remodeling and permanent damage to the lungs. Suboptimal management of asthma also results in increased hospitalizations, emergency care and other high-priced interventions, and adds to the number of days missed from work or school.

As more is learned about the mechanisms of asthma and its risk factors, and as new therapies are developed, the allergist can be expected to be at the forefront helping to control disease severity and diminish its progression.





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## References

1. Action Against Asthma. A Strategic Plan for the Department of Health and Human Services. May 2000.
2. National Asthma Control Program: An Investment in America's Health. 2013. United State Centers for Disease Control and Prevention, Atlanta, GA.
3. Smith DH, Malone DC, Lawson KA, et al. A national estimate of the economic costs of asthma. *Am J Respir Crit Care Med*. 1997;156:787-793.
4. Akinbami LJ, Moorman JE, Bailey C, et al. Centers for Disease Control and Prevention: Trends in asthma prevalence, health care use, and mortality in the United States, 2001–2010. NCHS data brief, no 94. Hyattsville, MD: National Center for Health Statistics. 2012.
5. Moorman JE, Akinbami LJ, Bailey CM, et al. National Surveillance of Asthma: United States, 2001–2010. National Center for Health Statistics. *Vital Health Stat* 3(35). 2012.
6. Morbidity and Mortality: 2012 Chart Book on Cardiovascular, Lung and Blood Diseases. National Institutes of Health, National Heart, Lung and Blood Institute. Feb. 2012.
7. Barnett SB, Nurmagambetov TA. Costs of asthma in the United States: 2002-2007. *J Allergy Clin Immunol*. 2011;127(1):145-152.
8. Cisternas MG, Blanc PD, Yen IH, Katz PP, Earnest G, et al. A comprehensive study of the direct and indirect costs of adult asthma. *J Allergy Clin Immunol*. 2003;111(6):1212-1218.
9. Wang LY, Zhong Y, Wheeler L. Direct and indirect costs of asthma in school-age children. *Prev Chronic Dis*. 2005;2(1).
10. National Heart, Lung and Blood Institute. Expert Panel Report 3. Guidelines for the Diagnosis and Management of Asthma 2007. Bethesda, Md: National Institutes of Health; Aug. 2007. NIH Publication No. 07-4051.
11. Nyman JA, Hillson S, Stoner T, DeVries A. Do specialists order too many tests? The case of allergists and pediatric asthma. *Ann Allergy Asthma Immunol*. 1997;79:496-502.
12. Slejko JF, Ghushchyan VH, Sucher B, et al. Asthma control in the United States, 2008-2010: Indicators of poor asthma control. *J Allergy Clin Immunol*. 2014;133(6):1579-1587.
13. Blaiss MS, Kaliner MA, Baena-Cagnani CE, et al. Barriers to asthma treatment in the United States: results from the global asthma physician and patient survey. *World Allergy Org J*. 2009;2(12):303-313. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3651005/>
14. Sullivan SD, Rasouliyan L, Russo PA, Kamath T, Chipps BE for the TENOR Study Group. Extent, patterns and burden of uncontrolled disease in severe or difficult-to-treat asthma. *Allergy*. 2007;62(2):126-133.
15. Vargas PA, et al. Symptoms profile and asthma control in school-age children. *Ann Allergy Asthma Immunol*. 2006;96:787-793.
16. Piecoro LT, Potoski M, Talbert JC, Doherty DE. Asthma prevalence, cost, and adherence with expert guidelines on the utilization of health care services and costs in a state Medicaid population. *Health Serv Res*. 2001;36(2):357-371.
17. Moon M. Costs of asthma care up by 54 percent in 10-year period. *Family Practice News*. Oct. 1, 2000.
18. Global Strategy for Asthma Management and Prevention. Global Initiative for Asthma (GINA) May 2014.
19. Finkelstein JA, Lozano P, Shulruff R, et al. Self-reported physician practices for children with asthma: Are national guidelines followed? *Pediatrics*. 2000;106(4):886-896.

20. Baptist AP, Baldwin JL. Physician attitudes, opinions, and referral patterns: comparisons of those who have and have not taken an allergy/immunology rotation. *Ann Allergy Asthma Immunol.* 2004;93:227-231.
21. Blanchette CM, Culler SD, Ershoff D, Gutierrez B. Association between previous health care use and initiation of inhaled corticosteroid and long-acting beta2-adrenergic agonist combination therapy among US patients with asthma. *Clin Ther.* 2009;31(11):2574-2583.
22. Broder MS, Gutierrez B, Chang E, Meddis D, Schatz M. Ratio of controller to total asthma medications: determinants of the measure. *Am J Manag Care.* 2010 Mar;16(3):170-1788.
23. Wu A, Young Y, Skinner EA, et al. Quality of care and outcomes of adults with asthma treated by specialists and generalists in managed care. *Arch Intern Med.* 2001;161:2554-2560.
24. Curwick CC, Bonauto DK, Adams DA. Use of objective testing in the diagnosis of work-related asthma by physician specialty. *Ann Allergy Asthma Immunol.* 2006;97:546-550.
25. Schatz M, Zeiger RS, Mosen D, Apter AJ, Vollmer WM, et al. Improved asthma outcomes from allergy specialist care: A population-based cross-sectional analysis. *J Allergy Clin Immunol.* 2005;116(6):1307-1313.
26. Schatz M, Zeiger RS, Vollmer WM, Mosen D, Cook EF. Determinants of future long-term asthma control. *J Allergy Clin Immunol.* 2006;148(5):1048-1053.
27. Schatz M, Cook EF, Nakahiro R, Petitti D. Inhaled corticosteroids and allergy specialty care reduce emergency hospital use for asthma. *J Allergy Clin Immunol.* 2003;111:503-508.
28. Diette GB, Skinner EA, Nguyen, TT, et al. Comparison of quality of care by specialist and generalist physicians as usual source of asthma care for children. *Pediatrics.* 2001;108(2):432-437.
29. Sin DD, Tu JV. Underuse of inhaled steroid therapy in elderly patients with asthma. *Chest.* 2001;119:720-725.
30. Finkelstein JA, Lozano P, Farber HJ, Miroshnik I, Lieu TA. Underuse of controller medications among Medicaid-insured children with asthma. *Arch Pediatr Adolesc Med.* 2002;156:562-567.
31. Shields AE, Comstock C, Finkelstein JA, Weiss KB. Comparing asthma care provided for Medicaid-enrolled children in a primary care case manager plan and a staff model HMO. *Ambul Pediatr.* 2003;3:253-263.
32. Hankin CS, Cox L, Lang D, et al. Allergen immunotherapy and health care cost benefits for children with allergic rhinitis: a large-scale, retrospective, matched cohort study. *Ann Allergy Asthma Immunol.* 2010;104:79-85.
33. Moore CM, Ahmed I, Mouallem R, et al. Care of asthma: allergy clinic versus emergency room. *Ann Allergy Asthma Immunol.* 1997; 78:373-380.
34. National Jewish Medical and Research Center; Outcomes prove asthma treatment programs improve disease management and control costs. Medical Scientific Update Publication volume 15, Number 3, Winter 1998.
35. Barnes CS, Amado M, Portnoy JM. Reduced clinic, emergency room, and hospital utilization after home environmental assessment and case management. *Allergy Asthma Proc.* 2010;31(4):317-323.
36. Liebhaber M, Bannister R, Raffetto W, Dyer Z. Drop-in group medical appointments for patients with asthma: a four-year outcomes study. *ISRN Allergy.* 2011 Jun 7;ID#178925.
37. Patel MR, Valerio MA, Janevic MR, et al. Long-term effects of negotiated treatment plans on self-management behaviors and satisfaction with care among women with asthma. *J Asthma.* 2013;50(1):82-89.

38. Mahr TA, Evans R. Allergist influence on asthma care. *Ann Allergy Asthma Immunol.* 1993;71:115-120.
39. Castro M, Zimmermann NA, Crocker S, Bradley J, Leven C, Schechtman KB. Asthma intervention program prevents readmissions in high healthcare users. *Am J Resp Critical Care Med.* 2003;168:1095-1099.
40. Villanueva AG, Mitchell L, Ponticelli D, Levine AS. Effectiveness of an asthma center in improving care and reducing costs in patients with difficult-to-control asthma. Abstract presentation, the American College of Chest Physicians annual meeting, October 2000.
41. Westley CR, Spiecher B, Starr L, et al. Cost effectiveness of an allergy consultation in the management of asthma. *Allergy Asthma Proc.* 1997;18:15-18.
42. Doan T, Grammar LC, Yarnold PR, et al. An intervention program to reduce the hospitalization cost of asthmatic patients requiring intubation. *Ann Allergy Asthma Immunol.* 1996;76:513-518.
43. Lafata JE, Xi H, Divine G. Risk factors for emergency department use among children with asthma using primary care in a managed care environment. *Ambul Pediatr.* 2002;2(4):268-275.
44. Vollmer W, O'Hollaren M, Ettinger K, et al. Specialty differences in the management of asthma. *Arch Int Med.* 1997;157:1201-1208
45. Gaioni S, Korenblat-Hanin M, Fisher E, Korenblat P. Treatment outcomes in an outpatient asthma center retrospective questionnaire data. *Amer J Managed Care.* Sept. 1996; 999-1008.
46. Selmi C. Novel challenges for the allergist. *Clin Rev Allergy Immunol.* 2011;41(1):1-3.
47. Chung KF, Wenzel SE, Brozek JL, Bush A, Castro M, et al. International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma. *Eur Respir J.* 2014;43:343-373.
48. Zeiger RS, Schatz M. Effect of allergist intervention on patient-centered and societal outcomes: allergists as leaders, innovators, and educators. *J Allergy Clin Immunol.* 2000;106(6):995-1018
49. Taylor DM, Auble TE, Calhoun WJ, et al. Current outpatient management of asthma shows poor compliance with international consensus guidelines. *Chest.* 1999;116:1638-1645.
50. Legorreta AP, Christian-Herman J, O'Connor RD, Hassan MM, Evans R, Leung KM. Compliance with national asthma management guidelines and specialty care: A health maintenance organization experience. *Arch Intern Med.* 1998;158:457-464.
51. Abramson MJ, Puy RM, Wiener JM. Allergy immunotherapy for asthma. *Cochrane Database Syst Rev.* 2000;2:CD001186.
52. Moller C, Dreborg S, Hosne FA, et al. Pollen immuotherapy reduces the development of asthma in children with seasonal rhinoconjunctivitis (the PAT-study). *J Allergy Clin Immunol.* 2002;109(2):251-256.
53. National Committee for Quality Assurance; The state of managed care quality, 2011; NCQA's State of Managed Care Quality Report.
54. Ein D, Foggs MB. Accountable care organizations and the allergist: challenges and opportunities. *J Allergy Clin Immunol Pract.* 2014;2(1):34-39.

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## Abstracts of Outcome and Cost Studies

Abramson MJ, Puy RM, Wiener JM. Allergy immunotherapy for asthma. *Cochrane Database Syst Rev.* 2000;2:CD001186.

**Conclusion:** Immunotherapy may reduce asthma symptoms and use of asthma medications.

**Specific findings:** A review of 54 trials was conducted to assess the effects of allergen-specific immunotherapy for asthma. Overall, patients receiving immunotherapy experienced a significant reduction in asthma symptoms and medication use compared to those randomized to placebo.

Baptist AP, Baldwin JL. Physician attitudes, opinions, and referral patterns: comparisons of those who have and have not taken an allergy/immunology rotation. *Ann Allergy Asthma Immunol.* 2004;93:227-231.

**Conclusion:** There are significant differences in the attitudes, opinions and referral patterns between physicians who have and have not taken an allergy/immunology rotation.

**Specific findings:** An anonymous questionnaire completed by 227 primary care physicians found that those who had taken an A/I rotation were more likely to feel they knew the types of cases seen by an allergist compared to those who had not taken an A/I rotation (75.9 percent vs 33.3 percent), to feel they knew an adequate amount about A/I (59.3 percent vs 19.5 percent), to view immunotherapy as effective (70.0 percent vs 52.3 percent) and to have referred a patient to an allergist (77.8 percent vs 46.0 percent).

Barnes CS, Amado M, Portnoy JM. Reduced clinic, emergency room, and hospital utilization after home environmental assessment and case management. *Allergy Asthma Proc.* 2010 Jul-Aug;31(4):317-323.

**Conclusion:** Home environmental assessment and case management may reduce medical care utilization for children suffering from allergic rhinitis and asthma.

**Specific findings:** This study retrospectively examined health care utilization of pediatric patients that had a home environmental assessment recommended by a pediatric allergist as part of a comprehensive case management program. Subjects were referred for case management by pediatric allergy specialists in a hospital-based clinic as indicated by high emergency room (ER) and hospital utilization. Case management included education, clinic visits, environmental assessment, and a single person responsible for following the subject's care. Home assessment included airborne spore collections, surface collections, and dust collection for evaluation of antigens.

Barnett SB, Nurmagambetov TA. Costs of asthma in the United States: 2002-2007. *J Allergy Clin Immunol.* 2011;127(1):145-152.

**Conclusion:** The current study finds that the estimated costs of asthma are substantial, which stresses the necessity for research and policy to work toward reducing the economic burden of asthma.

**Specific findings:** Over the years 2002-2007, the incremental direct cost of asthma was \$3,259 (2009 dollars) per person per year. The value of additional days lost attributable to asthma per year was approximately \$301 for each worker and \$93 for each student. For the most recent year available, 2007, the total incremental cost of asthma to society was \$56 billion, with productivity losses due to morbidity accounting for \$3.8 billion and productivity losses due to mortality accounting for \$2.1 billion.

Blaiss MS, Kaliner MA, Baena-Cagnani CE. Barriers to asthma treatment in the United States: results from the global asthma physician and patient survey. *World Allergy Org J.* 2009;2(12):303-313.

**Conclusion:** Similar to the global GAPP survey, the U.S.-specific findings indicate that in general there is a lack of asthma control, poor adherence to therapy, and room for improvement in patient-physician communication and partnership in treating asthma.

**Specific findings:** 208 adults with asthma and 224 physicians responded to the questionnaire. The majority of patients were being treated by a primary care physician (64 percent), 15 percent were being treated by specialists and 21 percent were not having their asthma treated by any physician or health care professional. Many of the patients may not have had well-controlled asthma, as 20 percent reported making an unscheduled telephone call to the doctor, 20 percent an unscheduled office visit, 6 percent an emergency department visit, and 4 percent reported being admitted to hospital in association with their asthma over the last year. Barriers to successful asthma treatment are created by notable differences between physician and patient perceptions regarding asthma and its effective treatment. The differences are particularly pronounced with regard to asthma education, awareness of side effects, disease symptoms, and adherence to asthma therapy.

Blanchette CM, Culler SD, Ershoff D, Gutierrez B. Association between previous health care use and initiation of inhaled corticosteroid and long-acting beta2-adrenergic agonist combination therapy among US patients with asthma. *Clin Ther.* 2009;31(11):2574-2583.

**Conclusion:** Just fewer than 40 percent of patients met the criteria for appropriate initiation of ICS/LABA therapy. Patients with appropriate initiation were significantly more likely to be treated by pulmonologists and allergists than by family medicine/general practitioners.

**Specific findings:** Of 16,205 patients initiated on ICS/LABA therapy, 39.2 percent met one or more criterion for appropriate use. Patients prescribed budesonide/formoterol fumarate dihydrate (BFC) had a significantly higher likelihood of meeting appropriateness criterion compared with fluticasone propionate/salmeterol (FSC) users. Also significantly associated with appropriate use were receipt of the initial ICS/LABA prescription from a pulmonologist or allergist rather than from a physician in family medicine/general practice, residence in the West relative to the Northeast and presence of specific comorbidities (allergic rhinitis, sinusitis, gastroesophageal reflux disease, and acute respiratory infection).

Broder MS, Gutierrez B, Chang E, Meddis D, Schatz M. Ratio of controller to total asthma medications: determinants of the measure. *Am J Manag Care.* 2010;16(3):170-178.

**Conclusion:** A high ratio of controller to total asthma medications is associated with greater controller adherence and with more controller fills. The ratio can be calculated using 1 or 2 quarters of pharmacy claims data, at a time when intervention may reduce asthma-related exacerbations. Interventions that may improve the ratio include changing from single inhaled corticosteroid therapy and to asthma specialist care.

**Specific findings:** The final study group comprised 38,538 patients with persistent asthma; 28,496 (73.9 percent) had high ratios. Specialty of usual-care physician differed, with more high-ratio patients than low-ratio patients having an allergist or pulmonologist. Patients who received combination

inhaled corticosteroid–long-acting  $\beta$ -agonist therapy or leukotriene receptor antagonist therapy were more likely to be in the high-ratio group compared with those dispensed a single inhaled corticosteroid.

Castro M, Zimmermann NA, Crocker S, Bradley J, Leven C, Schechtman KB. Asthma intervention program prevents readmissions in high healthcare users. *Am J Resp Critical Care Med*. 2003;168:1095-1099.

**Conclusion:** A brief intervention program focusing on high health care users with asthma resulted in improved asthma control, reduced hospital use and substantial cost savings.

**Specific findings:** A total of 96 adult subjects hospitalized with an asthma exacerbation who had a history of frequent health care use, were randomized to care by an asthma specialist or a generalist for six months. There was a 60 percent reduction in total hospitalizations, a 54 percent reduction in readmissions for asthma and a marked reduction in lost work or school days (246 vs 1,040 days) in the intervention group compared to the control group. Care by an asthma specialist resulted in a savings of \$6,462 per patient.

Cisternas MG, Blanc PD, Yen IH, Katz PP, Earnest G, et al. A comprehensive study of the direct and indirect costs of adult asthma. *J Allergy Clin Immunol*. 2003;111(6):1212-1218.

**Conclusion:** Asthma-related costs are substantial and are driven largely by pharmaceuticals and work loss.

**Specific findings:** In a study of 401 adults with asthma, total per-person annual costs of asthma averaged \$4,912, with direct costs accounting for \$3,180 (65 percent) and indirect costs \$1,732 (35 percent). The largest components of direct costs were pharmaceuticals, hospital admissions and non-emergency department ambulatory visits. Total cessation of work and the loss of entire work days accounted for 89 percent of indirect costs. Total per-person costs were \$2,646, \$4,530 and \$12,813 for persons reporting mild, moderate and severe asthma, respectively.

Curwick CC, Bonauto DK, Adams DA. Use of objective testing in the diagnosis of work-related asthma by physician specialty. *Ann Allergy Asthma Immunol*. 2006;97:546-550.

**Conclusion:** Appropriate diagnostic care received by workers with work-related asthma may be lacking, and physicians who have questions about diagnostic procedures should consider referral to a specialist.

**Specific findings:** A comparative evaluation of 301 workers' compensation claimants with work-related asthma found that only 36.9 percent were treated by specialists and less than half the claimants (43.2 percent) had received an objective evaluation of pulmonary function. Claimants treated by specialists were significantly more likely to have received diagnostic testing during evaluation of their disease than those treated solely by generalists (82.9 percent vs 20.0 percent).

Diette GB, Skinner EA, Nguyen, TT, et al. Comparison of quality of care by specialist and generalist physicians as usual source of asthma care for children. *Pediatrics* 2001;108(2):432-437.

**Conclusion:** Asthma care in children in two large managed care organizations was more likely to be consistent with national guidelines when a specialist was the primary provider.



**Specific findings:** A cross-sectional study of 260 children with asthma reviewed four domains of patient care, including patient education, control of factors contributing to asthma symptoms, periodic physiologic assessment and monitoring, and proper use of medications. In all four domains, care provided by a specialist was more likely to be consistent with guidelines. The greatest differences between specialist and generalist disease management were in the use of controller medications, having had a pulmonary function test and having been told about asthma triggers and how to avoid them.

Doan T, Grammar LC, Yarnold PR, et al. An intervention program to reduce the hospitalization cost of asthmatic patients requiring intubation. *Ann Allergy Asthma Immunol.* 1996;76:513-518.

**Conclusion:** An intervention program that included education, specialist care, regular outpatient visits and access to an emergency call service significantly reduced the cost of asthma care in patients intubated for asthma.

**Specific findings:** In a study of nine patients, the mean total cost of care decreased from \$43,066 the year before the intervention to \$4,914 the year after. Inpatient hospitalization costs decreased from \$40,253 to \$1,926. The costs of emergency services, outpatient services and medicines did not change significantly.

Finkelstein JA, Lozano P, Farber HJ, Miroshnik I, Lieu TA. Underuse of controller medications among Medicaid-insured children with asthma. *Arch Pediatr Adolesc Med.* 2002;156:562-567.

**Conclusion:** Medicaid-insured children who receive action plans, have follow-up visits or specialty consultations are less likely to be symptomatic underusers of controller medications.

**Specific findings:** Telephone surveys conducted with parents of children and adolescents aged 2 to 16 years with asthma who were enrolled in one of five managed care plans found widespread underuse of medications that control asthma symptoms. Having seen an asthma specialist was a factor associated with lower rates of underuse.

Finkelstein JA, Lozano P, Shulruff R, et al. Self-reported physician practices for children with asthma: Are national guidelines followed? *Pediatrics.* 2000;106(4):886-896.

**Conclusion:** Most physicians for children report having read and adopted NAEPP guideline recommendations for asthma treatment, but criteria for referral to an asthma specialist often differed from those of the guidelines. Opportunities for improvement also exist in areas such as the use of written care plans, optimizing anti-inflammatory medications and providing routine follow up.

**Specific findings:** In a survey, 427 pediatricians and family physicians reported criteria for referral that differed from national guidelines when it came to managing more severe patients without input from an asthma specialist. Family physicians were more likely than pediatricians to refer a child after a single hospitalization, two to three emergency department visits, two disease exacerbations, or when the child was under age three and required daily medications.

Gaioni SJ, Korenblat-Hanin M, Fisher EB, Korenblat P. Treatment outcomes in an outpatient asthma center: retrospective questionnaire data. *Amer J Managed Care*. 1996;999-1008.

**Conclusion:** Aggressive treatment at an asthma center had a positive and significant impact on asthma health outcomes and health system cost savings.

**Specific findings:** Treatment at an asthma specialty center resulted in a 78 percent reduction in hospitalizations, a 73 percent reduction in emergency room visits and a 48 percent reduction in unscheduled physician visits, according to a survey of 207 patients who had been treated at the center for at least one year. Overall net savings in medical system use was estimated to be \$2,714 per patient per year, for a total savings of more than \$560,000. Other improvements included decreases in severe shortness of breath from 48 percent to 15 percent, frequent depressed mood from 32 percent to 13 percent, and severe interference with daily activities from 31 percent to 11 percent. Patients also noted an increase from 48 percent to 96 percent in knowledge of self-care for asthma, and from 21 percent to 78 percent in satisfaction with professional asthma care.

Hankin CS, Cox L, Lang D, et al. Allergen immunotherapy and health care cost benefits for children with allergic rhinitis: a large-scale, retrospective, matched cohort study. *Ann Allergy Asthma Immunol*. 2010;104:79-85.

**Conclusion:** This study demonstrates the potential for early and significant cost savings in children with AR treated with immunotherapy. Greater use of this treatment in children could significantly reduce AR-related morbidity and its economic burden.

**Specific findings:** Among children with a Florida Medicaid paid claim between 1997 and 2007, immunotherapy treated patients were selected who had at least 18 months of data after their first immunotherapy administration. A control group of patients who had not received immunotherapy also were identified, and up to 5 were matched with each immunotherapy-treated patient by age at first AR diagnosis, sex, race/ethnicity, and diagnosis of asthma, conjunctivitis, or atopic dermatitis. Immunotherapy-treated patients had significantly lower 18-month median per-patient total health care costs (\$3,247 vs \$4,872), outpatient costs exclusive of immunotherapy-related care (\$1,107 vs \$2,626), and pharmacy costs (\$1,108 vs \$1,316) compared with matched controls. The significant difference in total health care costs was evident 3 months after initiating immunotherapy and increased through study end.

Lafata JE, Xi H, Divine G. Risk factors for emergency department use among children with asthma using primary care in a managed care environment. *Ambul Pediatr*. 2002;2:268-275.

**Conclusion:** Encouraging routine primary care visits and referral to an allergist may reduce emergency department use among children with asthma.

**Specific findings:** Children with asthma aged 5-14 treated by pediatricians in a large group practice were followed for two years. Emergency department use tended to be less among children who saw an allergist.



Legorreta AP, Christian-Herman J, O'Connor RD, Hassan MM, Evans R, Leung KM. Compliance with national asthma management guidelines and specialty care: a health maintenance organization experience. *Arch Intern Med.* 1998;158:457-464.

**Conclusion:** Although the National Asthma Education Program expert panel guidelines for the diagnosis and management of asthma were initially published in 1991, a survey of a major California HMO found compliance with the guidelines low. The results showed that asthma specialists provided more thorough care than did primary care physicians in treating patients with asthma.

**Specific findings:** Survey data were analyzed for 5,580 asthma patients covered by Health Net in California in 1996. Of respondents with severe asthma, 72 percent reported having a steroid inhaler, but only 54 percent used it daily. The patients of specialists were more likely to have a steroid inhaler and peak flow meter and to use them daily. Specialists also provided more patient education on how to prevent and control asthma attacks.

Liebhaber M, Bannister R, Raffetto W, Dyer Z. Drop-in group medical appointments for patients with asthma: a four-year outcomes study. *ISRN Allergy.* 2011 Jun 7;ID#178925.

**Conclusion:** Doctor Interactive Group Medical Appointments (DIGMA) was an effective, multidisciplinary asthma intervention that focused on behavior. It fulfilled the goals of asthma care as described by the 2007 NAEPP guidelines.

**Specific findings:** DIGMA was established to allow patients time to interact with an allergist, a behaviorist and an asthma educator in a group setting. Weekly meetings targeted patients with chronic asthma. Outcome parameters were established to assess the effectiveness of the program over a 4 year time period. Sixty four adult asthmatic patients were enrolled and followed for 4 years. The AQLQ test was administered each year. Spirometry, an analog self-assessment scale and the ACT were administered at each visit. Baseline rescue inhaler use was 4 per week compared to 1.5 per week at last visit. ACT scores are 18 at baseline and 19 at last visit. ER claims are 5 at one year prior to enrollment and 2 at the last year of DIGMA. Patient satisfaction improved from 30 to 34 at the last visit.

Mahr TA, Evans R. Allergist influence on asthma care. *Ann Allergy Asthma Immunol.* 1993;71:115-120.

**Conclusion:** Follow-up care by an allergist after hospitalization for asthma resulted in a decrease in subsequent hospitalizations and emergency room visits.

**Specific findings:** The retrospective study compared 83 patients who received asthma follow-up care by an allergist and 40 patients who received care from a non-allergist after hospitalization. Of patients who received follow-up care by an allergist, 13 percent were subsequently hospitalized, compared to 35 percent treated by non-allergists and 18 percent of the allergist patients had emergency room visits compared to 47 percent treated by non-allergists. There were significant increases in use of all medications and devices in the group treated by allergists.

Moller C, Dreborg S, Hosne FA, et al. Pollen immunotherapy reduces the development of asthma in children with seasonal rhinoconjunctivitis (the PAT-study). *J Allergy Clin Immunol.* 2002;109(2):251-256.

**Conclusion:** Immunotherapy can reduce the development of asthma in children with seasonal rhinoconjunctivitis.

**Specific findings:** More than 200 children ages 6 to 14 with moderate-to-severe hay fever symptoms were enrolled in the study. At the start of the study, none of the children reported an asthma diagnosis requiring daily treatment, however 20 percent had mild asthma symptoms during the pollen season(s). Among those without asthma, the children actively treated with immunotherapy had significantly fewer asthma symptoms after three years as evaluated by clinical diagnosis.

Moore CM, Ahmed I, Mouallem R, May W, Ehlayel M, Sorensen RU. Care of asthma: allergy clinic versus emergency room. *Ann Allergy Asthma Immunol.* 1997;78:373-380.

**Conclusion:** The decreased morbidity of asthma and cost of care for the allergy clinic patients, compared to the emergency room patients, are likely due to the care given in the allergy-immunology clinic.

**Specific findings:** Fifty emergency room patients and 25 allergy clinic patients were studied. The data showed no demographic or socioeconomic differences between the two groups. However, the clinic group had significantly less nocturnal cough, sleep interruption, missed school and emergency room visits resulting in approximate average savings of \$137 per patient per year.

Nyman JA, Hillson S, Stoner T, DeVries A. Do specialists order too many tests? The case of allergists and pediatric asthma. *Ann Allergy Asthma Immunol* 1997;79:496-502.

**Conclusions:** Allergists' test-intensive practice style is cost-effective.

**Specific findings:** A review of 1,574 pediatric asthma cases in a large health plan found that cases managed by allergists were no more costly than those managed by non-allergists, despite the fact that the allergists ordered significantly more tests and required more office visits than non-allergists. Patients treated by allergists experienced fewer hospitalizations and emergency room visits resulting in cost-savings due to improved outcomes and disease control.

Patel MR, Valerio MA, Janevic MR et al. Long-term effects of negotiated treatment plans on self-management behaviors and satisfaction with care among women with asthma. *J Asthma.* 2013; 50(1):82-89.

**Conclusion:** Women with asthma who had a negotiated treatment plan were more likely to see an asthma specialist. In the long-term, not having a treatment plan that is developed in partnership with a clinician may have an adverse impact on medication use and patient views of clinical services.

**Specific findings:** 38 percent reported having a negotiated treatment plan at three time points. Seeing an asthma specialist was associated with having a plan. Women who did not have a negotiated treatment plan at baseline, but acquired one at 12 or 24 months were more likely to report greater urgent office visits for asthma. No associations were observed between having a plan and urgent health care use or symptom frequency. When adjusting for household income, level of asthma control, and

specialty of the caregiving provider, women who did not have a negotiated treatment plan and those with a plan at fewer than three time points were less likely to report medication adherence and satisfaction with their care. No differences in asthma management self-efficacy or asking the doctor questions about asthma were observed.

Piecoro LT, Potoski M, Talbert JC, et al. Asthma prevalence, cost, and adherence with expert guidelines on the utilization of health care services and costs in a state Medicaid population. *Health Serv Res.* 2001;36(2): 357-371.

**Conclusion:** A review of asthma prevalence and utilization of health services in a Kentucky Medicaid population found widespread nonadherence to the National Asthma Education Program expert panel guidelines associated with an increase in asthma exacerbations that resulted in hospitalizations.

**Specific findings:** Of 530,000 Medicaid recipients, 24,365 (4.6 percent) were identified as having asthma. Average annual asthma-related costs (\$616) accounted for less than 20 percent of total health care costs (\$3,645). Less than 40 percent of the patients received a prescription for a rescue medication and fewer than 10 percent of the patients who received daily inhaled short-acting beta-2 agonists were regular users of inhaled steroids. Nonadherence to the guidelines was associated with an increased risk of an asthma-related hospitalization.

Schatz M, Cook EF, Nakahiro R, Petitti D. Inhaled corticosteroids and allergy specialty care reduce emergency hospital use for asthma. *J Allergy Clin Immunol.* 2003;111:503-508.

**Conclusion:** Care by allergy specialists and increased use of inhaled corticosteroids reduces emergency hospital use for asthma.

**Specific findings:** More than 9,600 asthmatic patients aged 3 to 64 years of age were identified from an electronic database of a large health maintenance organization. Dispensing of seven or more canisters of inhaled corticosteroids (ICs) annually and care by an allergy specialist were independently associated with reduced emergency hospital care. Patients with allergy specialist care were more likely than those without specialty care to receive seven or more dispensations of ICs.

Schatz M, Zeiger RS, Mosen D, Apter AJ, Vollmer WM, et al. Improved asthma outcomes from allergy specialist care: A population-based cross-sectional analysis. *J Allergy Clin Immunol.* 2005;116(6):1307-1313.

**Conclusion:** Allergist care is associated with a wide range of improved outcomes in asthmatic patients compared with care provided by primary care providers.

**Specific findings:** In a random sample of 3,568 patients with persistent asthma, patients of allergists reported significantly higher general physical and asthma-specific quality of life, less asthma control problems, less severe symptoms, higher satisfaction with care and greater self-management knowledge compared with those whose disease was managed by primary care providers. Patients of allergists were less likely to require an asthma hospitalization, unscheduled office visit or to overuse beta agonists, and were more likely to have received inhaled steroids during the past year.

Schatz M, Zeiger RS, Vollmer WM, Mosen D, Cook EF. Determinants of future long-term asthma control. *J Allergy Clin Immunol.* 2006;148(5):1048-1053.

**Conclusions:** Effective management strategies are associated with improved asthma control, even after accounting for characteristics that put patients at high risk for poor control.

**Specific findings:** Oral corticosteroids, unscheduled medical visits in the prior year, prior asthma hospitalizations, smoking, chronic obstructive pulmonary disease, male sex, black race and lower educational level were independently associated with poorer asthma control. Regular inhaled corticosteroids, long-acting beta agonists and asthma specialist care were independently associated with better control in high risk patients.

Shields AE, Comstock C, Finkelstein JA, Weiss KB. Comparing asthma care provided for Medicaid-enrolled children in a primary care case manager plan and a staff model HMO. *Ambul Pediatr.* 2003;3:253-263.

**Conclusion:** Children enrolled in a staff model HMO that provided greater access to asthma specialists were less likely to require emergency department visits or hospitalization, or to meet federal criteria for persistent asthma compared to patients in a primary care case manager plan (PCCM) that provided less access to specialist care.

**Specific findings:** In a study of 2,365 children with asthma in the Massachusetts Medicaid program, children in the HMO were only 54 percent as likely as those in the PCCM plan to experience an asthma emergency department visit or hospitalization, only half as likely to meet the NCOA definition for persistent asthma and only 32 percent as likely to have prior ED visits or hospitalizations. Children in the HMO were 2.9 times as likely to receive timely follow-up care and 1.8 times as likely to receive a specialist visit during the year.

Sin DD, Tu JV. Underuse of inhaled steroid therapy in elderly patients with asthma. *Chest.* 2001;119:720-725.

**Conclusion:** Despite their proven efficacy, inhaled steroids are underused in the elderly asthmatic population, with patients of primary-care physicians less likely to receive the therapy than patients of specialists.

**Specific findings:** Of the 6,254 Ontario, Canada, patients age 65 and older who experienced a recent acute exacerbation of asthma, 2,495 patients (40 percent) did not receive inhaled steroid therapy within 90 days of discharge from their initial hospitalization for asthma. Nonreceipt of inhaled steroid therapy was particularly prominent in older patients with multiple comorbidities. Moreover, those who received care from primary-care physicians were less likely to receive inhaled steroid therapy, compared to those who received care from specialists.

Slejko JF, Ghushchyan VH, Sucher B, et al. Asthma control in the United States, 2008-2010: Indicators of poor asthma control. *J Allergy Clin Immunol.* 2014;133(60):1579-1587.

**Conclusion:** Improvement of asthma control continues to be a US public health concern. Results suggest suboptimal asthma control with underuse of long-term control medications, overuse of quick-relief inhalers, and a significant number of self-reported asthma exacerbations.

**Specific findings:** The 2008, 2009, and 2010 Medical Expenditure Panel Surveys were used to examine the national prevalence of self-reported asthma, trends in medication use, and demographic characteristics of asthmatic patients. Of the 102,544 subjects asked about an asthma diagnosis, 9,782 reported lifetime asthma, and 8,837 reported current asthma. An asthma exacerbation in the previous year was reported by 5,005, of whom 4,521 used a quick-relief inhaler for asthma symptoms. Of this group, 60 percent were using daily long-term control medication but still required significant use of quick-relief inhalers, whereas 28 percent had never used long-term control medication. Of those who had a recent exacerbation, 29 percent were using daily preventive medication, whereas 54 percent had never used long-term control medication.

Smith DH, Malone DC, Lawson KA, et al. A national estimate of the economic costs of asthma. *Am J Respir Crit Care Med.* 1997;156:787-793.

**Conclusion:** Future asthma research and intervention efforts directed at reducing hospitalization and providing better care for high-risk asthma patients could help to decrease health care resource use and provide cost savings.

**Specific findings:** Based on an analysis of the 1987 National Medical Expenditure Survey, the total estimated annual cost of asthma is \$5.8 billion, with hospitalization accounting for half of all expenditures. More than 80 percent of resources were used by 20 percent of the population. The estimated annual per patient cost for high-risk patients was \$2,584, compared to \$140 for the rest of the sample.

Sullivan SD, Rasouliyan L, Russo PA, Kamath T, Chipps BE for the TENOR Study Group. Extent, patterns and burden of uncontrolled disease in severe or difficult-to-treat asthma. *Allergy.* 2007;62(2):126-133.

**Conclusion:** This multi-center U.S. study found that few severe or difficult-to-treat asthma patients achieved control over a two-year period and the economic consequence of uncontrolled disease is substantial.

**Specific findings:** The Epidemiology and Natural History of Asthma: Outcomes and Treatment Regimens (TENOR) study found that 83 percent of patients had uncontrolled asthma, 16 percent had inconsistent control and 1.3 percent were controlled. Controlled patients experienced fewer work or school absences and less health care resource use than uncontrolled patients. Costs for uncontrolled patients were more than double those of controlled patients throughout the study (\$14,212 vs \$6,452, adjusted to 2002 dollars).

Taylor DM, Auble DE, Calhoun WJ, et al. Current outpatient management of asthma shows poor compliance with international consensus guidelines. *Chest.* 1999;116:1638-1645

**Conclusions:** The outpatient management of most asthma patients requiring emergency room care does not comply with the consensus guidelines and patient knowledge of asthma is poor.

**Specific findings:** A prospective, researcher-administered questionnaire was used to evaluate 85 patients requiring emergency room treatment for asthma. The majority of the patients were not managed in compliance with expert guidelines, with 62 percent under treated with medications and 87 percent having no written plan of action. Only 28 percent of the severe asthmatics were treated by asthma specialists, far short of the 100 percent recommended by the guidelines. Knowledge of the disease and proper medication use also was low.

Vargas PA, et al. Symptoms profile and asthma control in school-age children. *Ann Allergy Asthma Immunol.* 2006;96:787-793.

**Conclusion:** Asthma was uncontrolled in 85 percent of inner-city students with asthma in Little Rock, Ark., based on the presence of symptoms and the need for rescue medicines.

**Specific findings:** Half of the children with active asthma had been treated in the emergency department at least twice in the previous two years, 52 percent often had to limit their activities, 29 percent reported nighttime symptoms once or more per week and 17 percent reported missing five or more days of school per year because of asthma.

Villanueva AG, Mitchell L, Ponticelli D, Levine AS. Effectiveness of an asthma center in improving care and reducing costs in patients with difficult-to-control asthma. Abstract presentation. American College of Chest Physicians annual meeting. Oct 2000.

**Conclusion:** A multi-disciplinary team specializing in the treatment of patients with difficult-to-control asthma can affect substantial cost savings while improving quality of care.

**Specific findings:** A review of 125 patients receiving care in an asthma center (AC) found high patient satisfaction, a significant reduction in the number of inhaled beta agonist prescriptions filled relative to the number of inhaled steroid prescriptions filled, large reductions in ER and hospital utilization and resultant decrease in cost. The number of hospitalizations was 38 before AC vs 4 after AC (89 percent reduction). The mean cost of the initial AC visit was \$770. The cost of ER care totaled \$34,706 before AC vs \$7,973 after AC. The cost of inpatient care totaled \$192,926 before AC vs \$20,308 after AC.

Vollmer WM, O'Hollaren M, Ettinger K, et al. Specialty differences in the management of asthma. A cross-sectional assessment of allergists' patients and generalists' patients in a large HMO. *Arch Intern Med.* 1997;157(11):1201-1208.

**Conclusion:** Specialist care was found to be of benefit to asthma patients in a large HMO. The allergists' patients conformed more closely to national asthma management guidelines and reported better quality of life than did the patients of generalists.

**Specific findings:** Nearly 400 patients ages 15 - 55 with physician-diagnosed asthma were studied. Patients receiving their primary asthma care from an allergist were considerably more likely to report using inhaled anti-inflammatory agents, oral steroids and regular breathing medications to control their asthma. Allergists' patients were more likely to have asthma exacerbations treated in a clinic rather than an emergency room and reported significantly improved quality of life.

Wang LY, Zhong Y, Wheeler L. Direct and indirect costs of asthma in school-age children. *Prev Chronic Dis* 2005;2(1).

**Conclusion:** The economic impact of asthma on school-age children, families and society is immense, and more public health efforts to better control asthma in children are needed.

**Specific findings:** An estimated 2.52 million children aged 5 – 17 years were treated for asthma in 1996. The total economic impact of asthma in school-age children was nearly \$2 billion, or \$719 per child with asthma. Costs were calculated in 2003 dollars.

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Abstracts of  
Outcome and  
Cost Studies

Westley CR, Spiecher B, Starr L, et al. Cost effectiveness of an allergy consultation in the management of asthma. *Allergy Asthma Proc.* 1997;18:15-18.

**Conclusion:** Referral to an allergist reduced the cost of asthma care by \$2,100 per patient.

**Specific findings:** The retrospective study evaluated the outcomes and treatment costs for 70 moderate-to-severe asthma patients treated in a Kaiser Permanente health plan in Denver. All patients were followed for at least one year by a primary care physician prior to evaluation and follow-up by a specialist for at least one year. Findings after the evaluation and follow-up with a specialist included a 67 percent decrease in the number of hospitalizations, a decrease in average hospital days from 4 to 2.5, a 45 percent decrease in sick care office visits and a 56 percent decrease in emergency room visits. Estimated cost savings for the 70 patients was \$145,500.

Wu A, Young Y, Skinner EA, et al. Quality of care and outcomes of adults with asthma treated by specialists and generalists in managed care. *Arch Intern Med.* 2001;161:2554-2560.

**Conclusion:** In a managed health care setting, physicians' specialty training and self-reported expertise in treating asthma were related to better patient-reported care and outcomes.

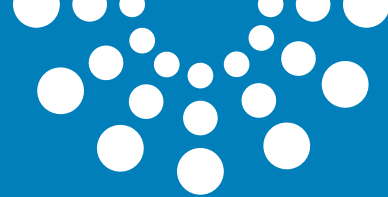
**Specific findings:** Based on a survey of 1,954 adult asthma patients enrolled in 12 managed care organizations and their 1,078 corresponding physicians, significant differences were noted for patients of specialist and generalist physicians. Compared with patients of generalists, outcomes for patients of allergists were significantly better with regard to canceled activities, hospitalizations and emergency department visits for asthma, quality of care ratings and physical functioning.

Zieger RS, Schatz M, Solari PG, Zazzali JL, Chen W. Real-time asthma outreach reduces excessive short-acting  $\beta$ 2-agonist use: a randomized study. *J Allergy Clin Immunol Pract.* 2014;2(4):445-456.

**Conclusion:** A novel administrative-based asthma outreach program improves markers of asthma impairment in patients without prior asthma specialist care and is adaptable to managed care organizations with electronic medical records.

**Specific findings:** Compared with controls, intervention patients reached 7 short-acting  $\beta$ 2-agonist (SABA) canisters ("rescue" medications) less frequently and later. The intervention reduced the risk of  $\geq 7$  SABA canister dispensings in patients without specialist care compared with patients with specialist care in the prior 3 years. Visits to allergists were more frequent for intervention patients (30.9 percent) than for control patients.





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