

Managed Care Best Practices In the Treatment and Management of Asthma

Based on a meeting in Chicago on April 29, 2005

HIGHLIGHTS

- The Burden of Uncontrolled Asthma
On the U. S. Health Care System
- Challenges in Evaluating and Treating Asthma
- The Importance of Risk Assessments
- Managed Care Strategies
For Successful Asthma Management
- Controlling Asthma Through Disease Management
- Panel Discussion

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INTRODUCTION

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Asthma is a complex respiratory disorder. It is a syndrome — not a single disease — with multiple phenotypes. Almost all asthma patients have subclinical evidence of chronic inflammation, even during asymptomatic periods. Some have relatively mild chronic symptoms, while others have chronic, daily, life-altering symptoms. Asthma also predisposes patients to acute exacerbations, which can be severe and life threatening. Even patients who have no, or relatively mild, daily symptoms are at risk for a severe exacerbation. Exacerbations cause morbidity and are associated with high health care resource utilization, including emergency department visits, hospitalizations, work and school absences, and decreased productivity.

Improvements in pharmacotherapy have led to the potential for improved clinical and economic outcomes. All evidence points toward the conclusion that many adverse clinical outcomes can be avoided with proper medical care delivery. Appropriate use of chronic controller treatment is associated with improved symptoms, decreased acute resource utilization, improved quality of life, and decreased nonmedication costs. Guidelines recognize the chronic nature of the disease and that much of the poor outcomes generally seen are associated with misdiagnosis or underdiagnosis, inadequate prescribing of preventive therapy, and poor adherence to treatment plans.

Recent advances in our understanding of the variable and syndromic nature of the disease have led to the possibility of improved and more individualized care pathways, which will increase the likelihood of successful outcomes for society, the patient, and the health care delivery system.

The issues of prompt and proper diagnosis remain, however. Adherence concerns also must be addressed as part of a chronic disease management approach. We now recognize that response to therapy is quite variable, with up to a third of patients not responding to inhaled corticosteroids — and even more not responding to leukotriene modifiers. We also appreciate that outcomes often do not correlate with one another. Thus, improvements in lung function do not necessarily signal decreased health care utilization or improved quality of life.

The focus on quality-of-life parameters and asthma control — rather than severity — is new, and likely will allow for more accurate monitoring of outcomes and improved care delivery.

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SUPPLEMENT TO
M A N A G E D
Care

August 2005

**Managed Care Best Practices in the Treatment
 And Management of Asthma**

A CONTINUING EDUCATION ACTIVITY

Based on a meeting in Chicago on April 29, 2005

| | |
|--|-----------------|
| Introduction | Opposite |
| ALLAN T. LUSKIN, MD | |
| PRESENTATIONS AND DISCUSSION | |
| The Burden of Uncontrolled Asthma on the U. S. Health Care System | 4 |
| SEAN D. SULLIVAN, PhD | |
| Challenges In Evaluating and Treating Asthma | 8 |
| KEVIN B. WEISS, MD, MPH, MS | |
| Achieving Asthma Control: the Need for Risk Assessment | 12 |
| ALLAN T. LUSKIN, MD | |
| Managing Asthma in a Managed Care Setting: Strategies for Treatment and Control | 16 |
| T. JANN CAISSON-SOREY, MD, MSA | |
| GWENDOLYN H. PARKER, MD | |
| Controlling Asthma Through Disease Management | 18 |
| CRAIG A. JONES, MD | |
| Discussion | 25 |
| <i>Panelists</i> | |
| CONTINUING EDUCATION | |
| Continuing Education Objectives and Accreditation Statements | 2 |
| Post-Test | 28 |
| Answer Sheet/Evaluation/Certificate Request..... | 29 |

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SELF-STUDY CONTINUING EDUCATION ACTIVITY

MANAGED CARE BEST PRACTICES IN THE TREATMENT AND MANAGEMENT OF ASTHMA

Continuing education credit is offered to physicians and pharmacists who read pages 4 through 27 of this publication, complete the post-test on page 28, and submit the evaluation form on page 29. Estimated time to complete this activity is 2 hours.

Target audiences

Managed health care professionals, including physicians, pharmacists, medical directors, chief medical officers, pharmacy directors, and other senior managers in managed care organizations.

PURPOSE AND OVERVIEW

These articles are derived from "Managed Care Best Practices in the Treatment and Management of Asthma," a meeting that took place in Chicago on April 29, 2005.

Asthma is a complex respiratory disorder that affects all age groups — approximately 5 million children and 10 million adults, including the elderly, in the United States. The economic burden on the U. S. health care system is enormous; in 1998, total costs attributed to asthma were \$12.7 billion.

The fallout of asthma is poor quality of life, with missed workdays and school days, poor work performance, and the inability to complete daily life activities. The reasons that treating asthma is difficult are many, and they include disease variability, patient underestimation of severity, lack of correlation between objective lung measures and outcomes and between disease severity and outcomes, the potential for severe exacerbations even with mild asthma, and poor patient adherence to therapy. An asthma disease management program, strictly followed, is one means of controlling asthma, which should be the primary objective for both physician and patient.

As diagnostic and treatment advances continue, physicians, pharmacists, and MCOs will need to be aware of the treatment and control options available for all levels of asthma and how to best integrate them into an effective asthma management program.

Educational objectives

After reading this publication and taking the post-test, participants will be able to:

- Explain the prevalence, costs, and quality-of-life issues related to asthma.
- Describe the challenges in evaluating and differentiating among mild, moderate, and severe asthma.

- Describe the treatment options for managing and controlling asthma, and compliance and adherence issues.
- Explain the importance of assessing risk factors in achieving asthma control.
- Discuss the challenges facing managed care organizations in controlling asthma.
- Recognize the value of a disease management program to control asthma.

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The Burden of Uncontrolled Asthma On the U. S. Health Care System

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With approximately 15 million Americans living with asthma, this chronic disease has substantial public health implications in the United States. Asthma affects all age groups — approximately 5 million children and 10 million adults, including the elderly (Redd 2002).

Data from the Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics (NCHS) document an increase in asthma prevalence from 1980 to 1998, particularly in children under the age of 4 years (CDC/NCHS 2000). In 1980, roughly 4 percent of people under 18 years old had asthma. By 1994, this rate had increased to almost 7 percent, or approximately 5 million people under age 18. Further, from 1982 through 1994, the overall annual age-adjusted prevalence rate of asthma for people younger than 18 years increased by 72 percent. Asthma now is the most prevalent chronic disease among children, and the number one reason for school absences. Asthma also hits African-American populations in the United States especially hard. The rates of death, hospitalization, and emergency department (ED) visits are 2 to 3 times higher for African-Americans than for whites.

The economic burden of asthma

Asthma is a significant burden on the U.S. health care system. In 2000, patients with asthma made more than 9 million physician office visits and had more than 500,000 hospitalizations. In addition, there are more than 5,000 asthma-related deaths each year. It appears, however, that the increasing trajectory of asthma-related deaths seen in the 1990s has leveled off. Many would like to attribute this occurrence to the improvement in treatment options and the implementation of disease management and clinical guidelines, but there is no published empirical evidence to prove this hypothesis. The total costs attributed to asthma in 1998 were a staggering \$12.7 billion dollars (Redd 2002).

The distribution of costs for the treatment of asthma includes direct and indirect costs. In terms of direct costs, of every dollar spent on asthma care, 42 cents is spent on medications, 29 cents is for inpatient hospitalizations, 11 cents goes to physician services, 10 cents goes to outpatient services, and 8 cents is spent on ED visits (Weiss 2001).

These data demonstrate a need to improve the medical management of asthma; it is not curable, but it is controllable. Obtaining and sustaining a state of control necessitates diligence, adherence, and patience on the part of the patient and the physician. Control of asthma also necessitates that health professionals stay current with advances in the medical science and the options available for maximizing control.

Most patients do not have controlled asthma

The literature indicates that most patients are not able to achieve control of their asthma. In a study by Bateman and colleagues (2001), patients with moderate asthma were treated with the existing gold standard, inhaled corticosteroids plus a long-acting beta-agonist. Results showed that control was achieved only a third of the time. Even by using a standard of control that allows patients to use a beta-agonist rescue inhaler during the day, asthma was controlled on only about half the days. The ideal of control that includes the elements listed in the box below is incredibly difficult to achieve.

Cost of asthma is dependent on level of control

Data developed by the National Institutes of Health suggest that the cost of asthma varies, depending on the

Goals of asthma therapy

A patient with controlled asthma should:

- Sleep through the night every night
- Have only occasional symptoms and need for beta-agonist rescue during the day (less than daily)
- Have full activity, including exercise, and miss no work or school due to asthma
- Not have exacerbations requiring emergency department visits or hospitalizations
- Have no significant side effects of therapy
- Have normal lung function at least within 80 percent of personal best
- Not demonstrate evidence of deterioration over time

level of control (Figure). The annual costs are least for patients whose asthma is controlled — approximately \$450. Caring for a patient with controlled asthma costs less than the average asthma patient at \$640 per year. In contrast, patients whose asthma is not controlled (e.g., having more than one hospital admission) are incredibly expensive at more than \$5,000 per year. The data also demonstrate that the type of services used by the patient directly affects the annual cost of asthma care. Thus, 4 percent of all asthma patients use 50 percent of asthma dollars. Controlling asthma, therefore, is a clinical and a financial goal, because with controlled asthma there is significantly less morbidity, and controlled asthma is 40 percent less costly to treat.

Description of TENOR Registry

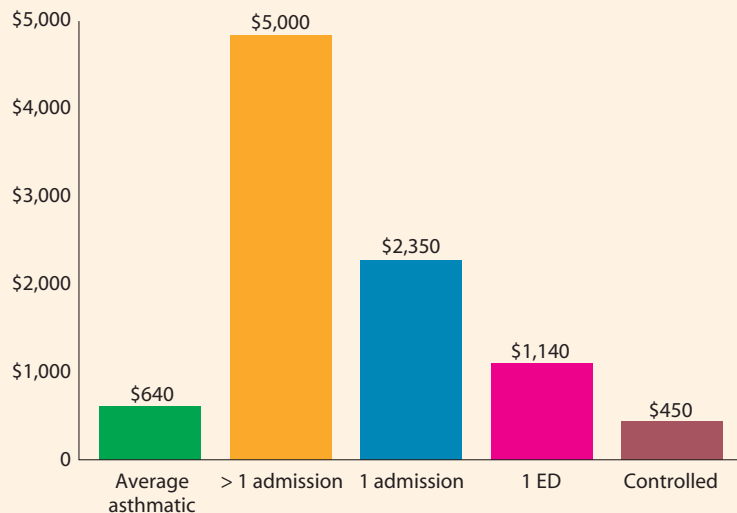
Published data about the prevalence of control in a population with asthma and the burden of uncontrolled disease are scarce; data from a 3-year, multicenter, longitudinal registry of patients with moderate-to-severe disease who are receiving usual care may help to shed some light on this area. This registry is called The Epidemiology and Natural History of Asthma: Outcomes and Treatment Regimens (TENOR) Registry.*

The primary objective of the TENOR registry was to describe the natural history of patients who are considered by physicians to have severe or difficult-to-treat asthma. In other words, it was the physicians who selected these patients to be entered into the cohort, based on assessments of the severity of their disease and whether or not their asthma was difficult to treat. Secondary objectives of the TENOR registry were to examine the relationship between features of asthma, treatments, and outcomes, and to observe the frequency of comorbid conditions.

Patients entered into the TENOR registry received medications and treatments administered for their asthma as indicated by their physician. At baseline, there were 4,756 patients, ages 6 years or above, from 283 sites (including MCOs, HMOs, community physicians, and academic centers) entered into the

*Jointly sponsored by Genentech, Inc. and Novartis Pharmaceuticals Corporation.

FIGURE Annual cost of asthma care



ED=emergency department visit.
SOURCE: NIH 1995

TENOR registry inclusion/exclusion criteria

Inclusion criteria:

- Subjects must have "severe" or "difficult-to-treat" asthma, in the opinion of a physician
- Mild or moderate patients were eligible for enrollment if they were considered difficult to treat by their physician and met the inclusion/exclusion criteria for the study
- Patients must have been receiving care from their current physician/provider for at least 1 year
- Patients were to be at least 6 years old
- Must be able to read and understand English

Subjects must have met at least one of the following criteria:

- During the past 12 months, 2 or more unscheduled care visits for their asthma
- During the past 12 months, 2 or more oral steroid "bursts"
- Currently require chronic daily high doses of inhaled steroids or ≥ 5 mg oral prednisone
- Currently using 3 or more medications to control asthma

Exclusion criteria:

- Heavy smoker (>30 pack years)
- Primary diagnosis of cystic fibrosis
- Severe cardiovascular disease (New York Heart Association class 2 or greater)
- Cancer (not including nonmelanoma skin cancer or subjects whose cancer has been "clear" for >5 years)
- Severe psychiatric disorder (not including anxiety or depression)
- Significant systemic disease (<2–3 year life expectancy)
- Known drug abuser

TABLE 1 Outcomes of interest evaluated by TENOR**Outcomes**

| | |
|---------------------------------------|---|
| Health care utilization | Number of asthma-related visits to the ED Number of asthma-related overnight hospitalizations Number of asthma-related scheduled office visits Number of asthma-related unscheduled office visits/contacts Number of steroid bursts Need for intubation or a mechanical ventilator |
| Days of school/work missed | Number of days missed because of asthma during the 14 days prior to each study evaluation For children ≤12 years, the number of school days or workdays a parent missed due to the child's asthma |
| Asthma symptoms and control | Measured using the Asthma Therapy Assessment Questionnaire (ATAQ) |
| Asthma-related quality of life | Measured using the Juniper Mini AQLQ and PAQLQ |
| Lung function | Measured by FEV ₁ |

AQLQ=Asthma Quality of Life Questionnaire, ED=emergency department, FEV₁=forced expiratory volume in 1 second, PAQLQ=Pediatric Asthma Quality of Life Questionnaire.

database. Some treatment outcomes evaluated in the TENOR registry are shown in Table 1.

Using TENOR to characterize the burden of uncontrolled asthma

Data from the TENOR registry were examined with the goal of identifying the prevalence and temporal patterns and the correlates of asthma control. In addition, given control, data were examined to estimate the burden of uncontrolled disease to patients in the health care system.

To investigate the extent to which patients do achieve control and the maintenance of control over time, two measures of control were used. One measure was an approximation of the composite measure of control used by Bateman and colleagues (2004) in the Gaining Optimal Asthma Control (GOAL) study. The GOAL study had three groups (totally controlled, well controlled, and not controlled), but due to the nature of the TENOR registry database, only two groups (controlled and not controlled) were defined. The second control index evaluated was the Adult Asthma Therapy Questionnaire, a multidimensional, validated instrument to assess asthma control. For this analysis, only a subset of the TENOR registry database was used. The subset included 2 years of

data only for patients ages 13 years and older who had complete data at all time points (Table 2).

Using the Bateman criteria, at baseline, patients with uncontrolled asthma comprised almost 95 percent of the population. Among these, 93 percent remained uncontrolled at the 12-month follow-up. Of those who were uncontrolled at the 12-month time point, 95 percent of patients subsequently remained uncontrolled at the 24-month follow-up. At all time points in the 24-month study period, 83 percent of patients had uncontrolled asthma. Only 1.3 percent of patients had controlled asthma. During the 2-year period analyzed, 15.7

TABLE 2 Baseline demographics and data for analysis of disease burden using the TENOR registry

| | Controlled (n=216) | Uncontrolled (n=3,700) | P value |
|------------------------------------|-------------------------------|-----------------------------------|----------------|
| Age | 43.4 | 44.8 | NS |
| percent female | 57.9 | 68.2 | <.001 |
| percent severe* | 30.1 percent | 52.5 percent | <.0001 |
| FEV ₁ percent predicted | 92.0 | 79.5 | <.0001 |
| ATAQ | | | |
| 0 barriers | 101 (48.3 percent) | 489 (13.7 percent) | |
| 1 barrier | 56 (26.8 percent) | 674 (18.8 percent) | |
| 2 barriers | 49 (23.4 percent) | 1,184 (33.1 percent) | |
| 3 barriers | 3 (1.4 percent) | 1,234 (34.5 percent) | <.001 |

ATAQ=Adult Asthma Therapy Questionnaire, FEV₁=forced expiratory volume in 1 second, NS=not significant.

*Physician assessed.

percent of patients moved in and out of the controlled group.

To estimate the burden of disease, a profile of health care resource use and productivity loss for all patients over the 24-month period was created. Monetary values (2002 US dollars) were assigned to the resources consumed (office visits, drug prices, etc.), and estimates of burden by level of disease control were computed using the Bateman criteria.

Mean costs for patients who remained controlled through the 2-year period were \$6,452. Mean costs for patients who remained uncontrolled through the 2 years were \$14,212. The difference between the two groups was statistically significant ($P < .001$).

Thus, achieving and maintaining disease control was difficult for these moderate-to-severe patients with asthma. Control could not be achieved by 85 percent of patients in the 2-year period analyzed. Health care expenses for patients with uncontrolled disease were more than twice that for asthma patients with good control.

Limitations of this analysis

There were a number of limitations to the analyses of the TENOR data to examine disease burden. TENOR is a 3-year cohort study of moderate-to-severe asthma and usual care practice. These patients may have been enrolled because they were uncontrolled. Children ages 12 and under were not included, because measures needed to match the Bateman criteria were not available. Also,

Bateman and colleagues used prospectively collected data on elements of control. The analysis of TENOR data relied on proxies.

Conclusion

Clinical researchers and guideline developers are embracing the concept of disease control in asthma. Little is known, however, about the extent and expense of uncontrolled asthma in the population, and the degree to which current treatments can improve and sustain control. Using TENOR, it was possible to estimate the prevalence of uncontrolled disease, and to show that expenses are extremely high for uncontrolled asthma relative to controlled asthma.

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Challenges in Evaluating and Treating Asthma

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In working to improve the care of patients with asthma, we come across unique challenges. Unlike our colleagues who treat diabetes or hypertension, we lack the stable measurements and clear-cut criteria to create a simple set of easily monitored outcomes. Various factors contribute to the challenge of treating asthma, but they tend to fit within 1 of 6 categories: 1) disease variability, 2) patient underestimation of severity, 3) lack of correlation between objective lung measures versus other types of outcomes, 4) lack of correlation between disease severity and outcomes, 5) the potential for severe exacerbations in patients with mild asthma, and 6) the issue of adherence and how it plays into our ability to evaluate and treat asthma.

Disease variability

The first challenge in treating asthma comes with the high disease variability. To get a sense of how variable lung function in patients with asthma can be, we can examine work that was done on the lung function of healthy subjects.

Beckett and colleagues (1997) investigated lung bronchial hyperresponsiveness in 100 nonasthmatic persons by use of a methacholine challenge. Results showed that subjects had increasing or decreasing variability in the PC₂₀, the provocative challenge wherein 20 percent of volunteers were able to show variability by doubling the dosages. Thus, approximately 30 percent of these normal, nonasthmatic persons, when challenged, showed variability in their lung responsiveness. The study examined these persons through a period of years and showed that each year about 30 percent showed lung variability out to 4 years. Therefore, even looking at normal people in terms of lung function, we see lung function variability. The question then arises, "How do we examine and interpret variability in patients with asthma?"

Geography also can contribute to disease variability. A study by Manfreda and colleagues (2004) examined variability in bronchial reactivity throughout Canada, and compared variability with 35 sites in 16 countries. Using the same methacholine challenge to measure bronchial hyperresponsiveness in Canada, they reported that in Halifax, located on the Atlantic coast, results showed that rates of variability were very low. In contrast, in Hamilton, which is inland about 100 miles from the urban Detroit area in the United States, variability was high.

With asthma, temporal factors also are involved. Studies have shown that there are huge seasonal variations in asthma morbidity as expressed by mortality and by hospitalization rates that are not easily explained. These observations are consistent from year to year with a small increase in the spring and another in the fall. There is a phase shift between children and adults. In adults, there is a shift not in the fall but in the winter, suggesting different etiologic reasons for that variability.

There is also well-known gender variability in asthma, and this variability changes with time. In addition to temporal and gender influences, there is emerging literature that suggests racial, cultural, social, and environmental factors all can affect how the disease is expressed in populations. Thus, there is a basic understanding that asthma is not a consistent disease that can be easily defined relative to time, geography, or gender. This is the basis for why asthma is a challenge to evaluate and treat.

Patient underestimation of severity

The generally held belief is that patients tend to underestimate the severity of their symptoms, and little data are available on this topic in the published literature. In the Asthma in America Survey, sponsored by GlaxoSmithKline in 1998, researchers examined how asthma is reported compared with how patients are questioned (Fuhlbrigge 2002). When patients were asked about short-term symptoms (i.e., over the past couple of weeks) or about long-term symptoms (i.e., over the past month or two), responses fell more into the mild intermittent category (Figure 1).

When patients were asked how the asthma is affecting them (via functional or global burden measures), responses fell into an extremely different distribution. Even though the patients may have had what appeared to be mild intermittent symptoms, the impact may have made them feel like they had moderate or severe persistent illness.

An examination of what patients report compared to what health systems report further supports the assumption that patients have a tendency to underestimate their disease severity. Erickson and Kirking (2004) examined severity (as determined by use of relievers and/or oral steroids or use of multiple drugs) against self-reported scores on the Asthma Quality of Life Questionnaire (AQLQ). Results showed an extremely low correlation (0.24 for reliever/oral steroid use and 0.25 for

multidrug use) between how the patients reported themselves on the AQLQ versus medication use.

Lack of correlation between FEV₁ and other outcomes

To gain further insight into the challenges of treating asthma, the best available literature perhaps focuses on how well lung function correlates to outcomes. Laviertes and colleagues (2001) examined the Borge score, which is a simple score of how hard it is to breathe, compared with other measures of pulmonary function. Their study demonstrated an extremely poor correlation between patients' perception of breathlessness and their score for forced expiratory volume in 1 second.

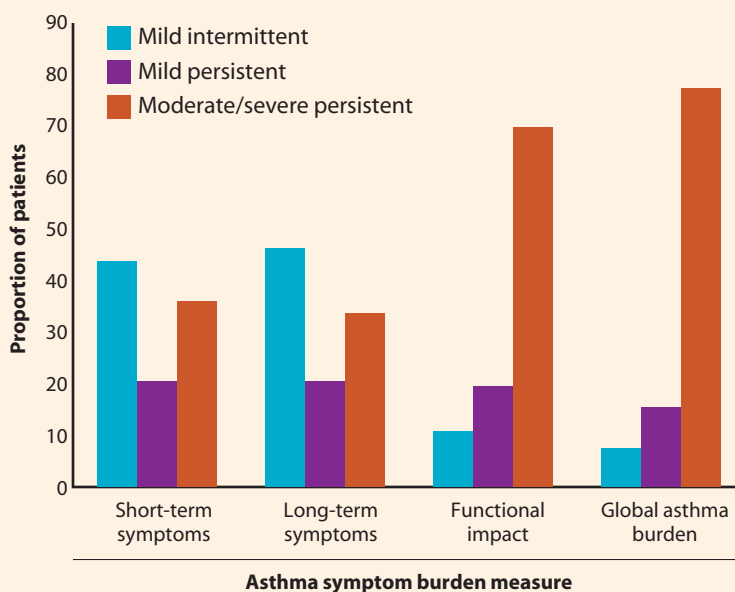
Similarly, Zhang and colleagues (2002) examined two randomized, controlled trials of montelukast in an attempt to understand the relationship between FEV₁ and outcomes. The two studies included more than 1,500 patients with mild to moderate asthma. The two highest correlations found were morning peak flow and FEV₁ and beta-agonist use and symptom score. Thus, one might interpret this as the more a patient uses a beta agonist, the more likely they are to experience symptoms.

Variability of symptoms also was examined in patients with mild asthma in the MIAMI (Mild Asthma Montelukast versus Inhaled Corticosteroid) study of montelukast versus fluticasone (Zeiger 2004). Patients had an FEV₁ of approximately 95 percent, a normal value. Although these patients should show few or no symptoms, study results showed a wide distribution of asthma symptoms in these patients.

Another study examined aggregate data of more than 9,000 subjects from 27 randomized controlled trials to look at correlations between changes in baseline among differing outcomes — symptom-free days, rescue-free days, percent-predicted FEV₁, and albuterol use (Caranza-Rosenzweig 2004). Of the high correlations (>0.5), rescue-free days, where a patient needs to take a beta agonist to feel better, correlated with symptom-free days, and rescue-free days correlated to self-reported use of albuterol. FEV₁ did not correlate to symptoms.

Kitch and colleagues (2004) examined asthma attacks and FEV₁, where asthma attacks were measured by use of oral steroids, an emergency department (ED) visit, or an unscheduled visit. In the U.S. cohort, a relationship

FIGURE 1 Prevalence of asthma by various patient self-reported measures (Asthma in America Survey)



SOURCE: FUHLBRIGGE 2002

was seen only in the 70 to 79 percent of predicted FEV₁, suggesting that attacks do not correlate well with FEV₁ for the large proportion of patients with asthma who have relatively normal lung function.

Lack of correlation between disease severity and outcomes

The fourth area of challenge with asthma is the lack of correlation of disease with severity outcomes. The Asthma in America Survey suggested that the lack of correlation may be related to our ability, or inability, to classify disease (Fuhlbrigge 2002). Figure 2, on page 10, shows the results from the short-term symptom burden subgroup. Several outcomes that might be related to the severity classifications are listed.

Reliever usage seemed to better differentiate mild intermittent asthma from any kind of persistent asthma. Controller medicine use in the past few weeks showed the same sort of differentiating mark. Hospitalizations did not seem to differentiate among the mild groups but did seem to differentiate between the mild groups and the moderate/severe groups. Urgent-care visits seemed to show more of a difference between intermittent and persistent asthma. When non-health care variables were examined, such as missing school days or perceived health satisfaction, there seemed to be more of a gradient.

Thus, in terms of the relationship between disease severity and health outcomes, different indicators may

FIGURE 2 Asthma in America Survey: short-term symptom burden subgroup

| | Mild intermittent (n=781) | Mild persistent (n=368) | Moderate/severe persistent (n=639) |
|---|------------------------------|----------------------------|---------------------------------------|
| Use of reliever prescription in last 4 weeks (% yes) | 42.1 | 77.4 | 81.2 |
| Controller medication use in last 4 weeks (% yes) | 16.5 | 29.7 | 31.1 |
| Hospitalized in past year (% yes) | 3.6 | 3.6 | 13.9 |
| Urgent care visits in past year (% yes) | 16.1 | 28.4 | 33.6 |
| Percent missing ≥ 6 days from work or school past year | 4.4 | 11.4 | 19.2 |
| Health satisfaction (% excellent/very good) | 59.0 | 46.7 | 31.6 |

SOURCE: FUHLBRIGGE 2002

discriminate more accurately between severity and outcomes.

Mild asthma and potential for severe exacerbations

Few data exist on the topic of the mild asthmatic and the potential for severe exacerbations in adult populations. The MIAMI study, however, is useful because it is a study of people with mild asthma (Zeiger 2004). Results of the prestudy parameters demonstrated that even with mild asthma (defined as an FEV₁ of 94 percent or better), there was a large number of rescue-free days (>46 percent in patients with daily symptoms and >58 percent in patients with less than daily symptoms); more than a third of all patients experienced more than 2 nighttime awakenings per month; and all patients used a beta agonist a few times per week prior to the study.

The MIAMI study also showed that in the course of 12 months, a little more than 8 percent of patients had been to the ED, and almost twice that number had an exacerbation requiring oral steroids. Essentially, what was defined as mild was not very mild in terms of control. In addition, these data suggest that the patient with mild asthma has the potential for severe exacerbations.

Adherence and its role in evaluating and treating asthma

To understand the challenge in treating asthma, we must examine adherence, which may be the pathway to obtaining control. Figure 3 shows one of the few pathway maps on asthma in terms of patient adherence (Apter 2003). This map specifically examines adherence to inhaled corticosteroid use.

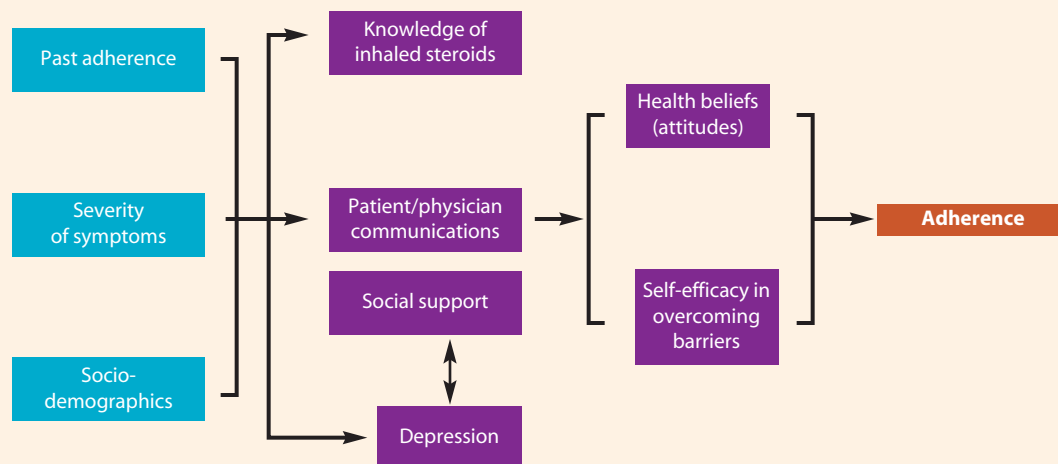
The pathway points out some factors determined by the patient, including a past history of adherence, severity of symptoms, and sociodemographics. From there, one can look at what the health system can do, which is to increase the knowledge of steroid use via patient-physician communications, and possibly address depression and potentially mitigate it by social support. All these factors could affect health beliefs and attitudes and self-efficacy in overcoming any barriers to good use of medicine. These factors also can lead to adherence.

The pathway of adherence is based on conjecture. Some of these factors have been measured, and we are only in the initial stages of understanding this kind of model. When actual adherence is examined in studies, results show adherence drops within weeks or even days of treatment initiation.

Apter and colleagues (1998) examined a chronologue of the use of inhaled corticosteroids for 50 patients over the course of 6 weeks. After the first week, only about 70 percent of patients used their treatment, indicating that there was an immediate drop-off, which then continued to the end of the 6-week period to approximately 60 percent of patients.

In another study, chronologue devices for inhaled corticosteroids and for oral corticosteroids were used for 60 patients who were discharged from the ED after an asthma exacerbation (Krishnan 2004). In a sense, these were patients who were in a teachable moment (if we accept that concept). But, as with other studies, results showed that oral corticosteroid and inhaled corticosteroid usage consistently dropped to around 50 percent adherence in a period of days following the asthma attack. This demonstrates that even when patients are ex-

FIGURE 3 Conceptual path model of selected factors related to adherence with chronic ICS usage



ICS=Inhaled corticosteroid.

SOURCE: APTER 2003

pected to be most adherent, they do not act in such a manner.

Conclusion

The inherent challenges in studying and treating asthma explain, in part, why control of the disease is so difficult to achieve. Successful control of the disease even for patients with mild disease is impaired by our inability to measure outcomes consistently and accurately.

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Achieving Asthma Control: The Need for Risk Assessment

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Asthma management begins when a symptomatic person with asthma does or does not go to see a physician. Data suggest that people with asthma symptoms typically consult a physician for other health problems, but they may not talk about their respiratory complaints. When there is physician contact, both physician and patient often downplay symptoms, and diagnosis becomes a problem.

Potentially, there exists a large percentage of people who are undiagnosed, despite symptoms of asthma. The current asthma management pathway shows that the number of people in the United States with significant respiratory complaints who are untreated may be well over 30 percent, and that 40 to 50 percent of patients with diagnosed asthma are undertreated (Figure 1). Of those treated, compliance rates can be less than 50 percent. Lack of compliance leads to increasing symptoms, which then leads to more physician visits, and eventually to a vicious cycle of increased morbidity, potential for mortality, and excess costs. What current data also make clear is that asthma is a syndrome rather than a disease.

who are frequent wheezers have a higher prevalence of missed school days and limitations in activity (Yeatts 2000). Other data show that managed care organizations with the highest prevalence of asthma among patients also have the lowest use of emergency services (Stempel 1997, Donahue 2000), thus suggesting that those MCOs that are best at diagnosing asthma may have the best chance of adequately controlling asthma. Data also show that undiagnosed asthma results in double the cost for care as does diagnosed asthma (Bukstein 2001).

Dimensions of control. Control clearly is what counts in treating asthma. The physiologic measurements of lung function are no longer the major focus of ongoing monitoring of current asthma status. Although the easy availability of reliable spirometry measurements remains critical for an accurate diagnosis, those measurements are not as important in assessing control parameters as other life factors. Symptoms and their effect on daily life activities such as work and school absence and performance, medication use (including adverse events), ad-

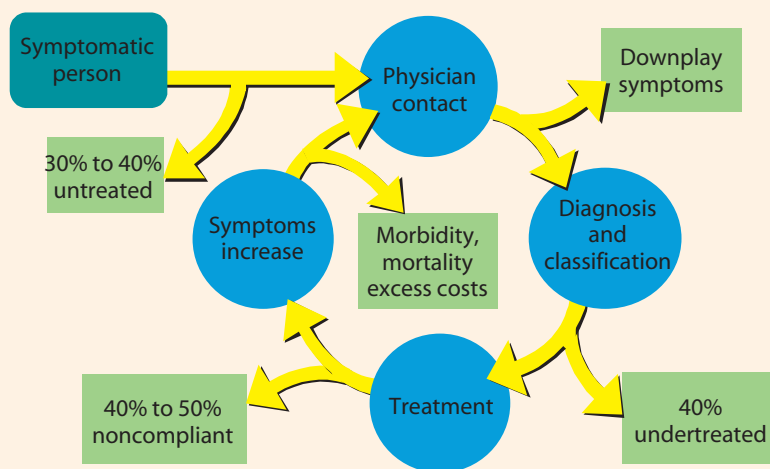
Variability: barrier to achieving asthma control

The asthma phenotype is highly variable from clinical, pathologic, and physiologic perspectives. Response to therapy is extremely variable. Bronchial hyperactivity and reversible airflow obstruction, both of which are hallmarks of asthma, do not readily predict whether a patient will respond to therapy. Additionally, various outcomes do not necessarily correlate with each other.

Diagnosis and asthma control

Misdiagnosed and underdiagnosed asthma can affect outcomes and control of the disease. Data from a study in North Carolina show that undiagnosed children

FIGURE 1 Current asthma management pathway



herence issues, health care utilization (a function of exacerbations), and comorbidities are much more important in terms of control.

Guidelines and control. The initial guideline approach to asthma control was a one-size-fits-all approach, with a cursory phenotyping by severity — mild, moderate, and severe — and, more recently, by mild intermittent, mild persistent, moderate, and severe. The initial guidelines recognized that most adverse outcomes result from poor diagnosis and inadequate prescribing and less-than-optimal adherence to therapy. Because most asthmatics respond to treatment with corticosteroids and beta agonists, significant improvement in asthma outcomes could be achieved if physicians properly prescribed, and patients adhered better to, asthma medications. Unfortunately, implementation of guidelines has been poor, and adherence to guidelines has not achieved the hoped-for results. Recent data indicate that understanding the variability of the disease and focusing on control could be a more effective approach.

Perception of severity and outcomes in asthma

Patient assessment of severity. The Asthma in America Survey (2001) examined severity perception by patient self-reporting and by using the National Asthma Education and Prevention Program (NAEPP) guidelines. Results showed that 60 percent of patients with moderate disease, as defined by the NAEPP guidelines, have none or mild symptoms. On the other hand, 25 percent of patients with intermittent to mild disease per the guidelines have moderate to severe symptoms. Thus, the issue is not really if the patients are underestimators or whether the guidelines do not define them, but that severity as defined by the guidelines does not necessarily correlate well to patients' self-reported severity, at least as measured by symptoms. This is one reason for the major move away from severity as a defining factor in determining what therapy patients ought to receive.

Physician assessment of Severity. Physician assessment of severity also may not completely correlate with symptom severity. In a study by Diette and colleagues (2004), 80 percent of patients whose asthma was diag-

FIGURE 2A Symptom perception versus reality

Current symptoms and physician severity rating

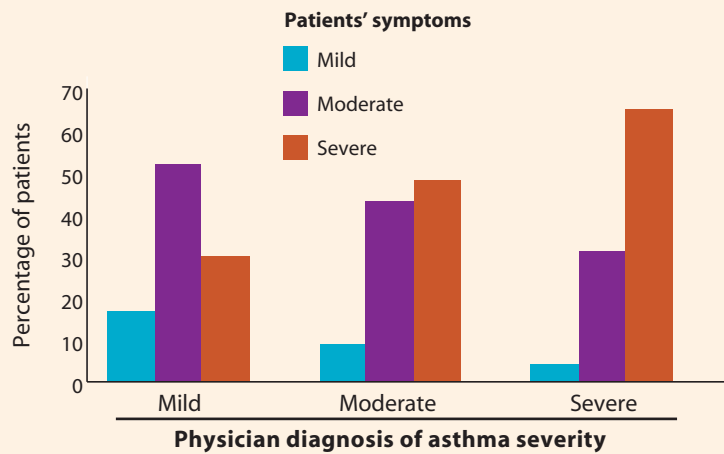
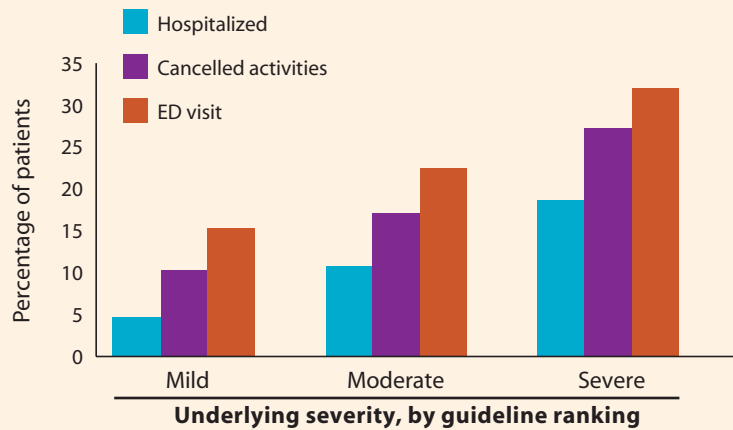


FIGURE 2B Correlation with health care utilization

Underlying severity and future use of health care services

- Who are these patients?
- Which mild patients get sick?
- Which severe patients stay well?



ED=emergency department.
SOURCE: DIETTE 2004

nosed by a physician as mild experienced moderate-to-severe symptoms. In this study, physicians were trained in ranking severity before seeing patients. In all, there was only about a one-third concordance between asthma symptoms and severity classification. This study adds to the body of literature that suggests that severity is not an accurate reflection of disease activity and burden (Figure 2a).

Assessment of severity and health care utilization. In the same study by Diette, some correlation was found between guideline ranking and future health care utiliza-

tion (Figure 2b, page 13). Still, approximately 25 percent of the patients with asthma ranked as mild will have an emergency department event, a cancelled activity, or a hospitalization. On the other hand, about 25 to 30 percent of patients with severe asthma, as defined by guidelines, appear to follow a rather benign course. If risk assessment could better define which “mild” patients will get sick and which “severe” patients will stay well, MCOs could then target interventions more precisely, better utilize health care resources, and potentially cut costs.

Risk assessment for adverse outcomes

The literature supports obesity, smoking, and race and genetics as risk factors for asthma and that they merit more attention. These factors should be part of an overall risk assessment that includes baseline disease severity and history of adherence to treatments and control status.

Obesity and asthma. Based on an analysis of data from the National Health and Nutrition Examination Survey (NHANES) studies I, II, and III, Ford and Mannino (2005) found that asthma rates were higher in both obese and overweight patients (body mass index [BMI] >30 kg/m²).

Varraso and colleagues (2005) examined two risk factors for asthma together: BMI quintiles in men and women, and early menarche plus obesity in women. Their research shows that in each increasing BMI quintile in men, there is a slight increase in obesity and an increase in clinical asthma severity scores. For women who did not have early menarche, there is some correlation with BMI and asthma severity; for women who had early menarche, however, there is a much higher correlation with obesity, and a high clinical asthma severity score. The most obese women with early menarche had extremely high severity scores. The mechanisms that underlie this association remain obscure. Thus, emerging data show that not only is obesity a risk factor for asthma, it is, potentially, a risk factor for severe asthma. Obesity also may be a risk factor for therapeutic response.

Mancuso and colleagues (2004) examined three populations with asthma: normal weight (BMI <25), overweight (BMI 25–28), and obese (BMI >29), and found that response to montelukast, a leukotriene modifier, or the corticosteroid beclomethasone was reduced, particularly in the obese asthma population. Because

excess weight may adversely affect treatment and outcomes, weight management for overweight and obese patients with asthma may be an important component in the treatment of these patients.

Smoking and asthma. Environmental tobacco smoke has long been known as a risk factor for developing asthma and a trigger for asthma attacks. Recent research shows that smoking reduces response to asthma treatment. One study examined smoking as a factor for response to corticosteroids by measuring FEV₁, asthma symptom scores, and overall control (Chaudhuri 2003). Figure 3 summarizes the results of that study. Results showed that patients who had never smoked were likely to respond to corticosteroids. In contrast, smokers responded poorly to corticosteroids. These data point out how important it is for MCOs to target cigarette smoking and environmental tobacco smoke, because this environmental factor is potentially a determining response to asthma therapy.

Race, genetics and asthma. Race and other genetic factors also may play a role in response to asthma therapy. In a study to examine responses to corticosteroids in blacks versus whites, it was found that people with asthma from both races tend not to respond as well to steroids as people without asthma (Federico 2005). In general, blacks also tended not to respond as well as whites whether asthmatic or not. The observation that black asthmatic subjects required a greater concentrations of corticosteroids to show a response than white asthmatics suggests that blacks have a racial predisposition to diminished steroid responsiveness, which may contribute to their heightened asthma morbidity.

A study by Israel and colleagues (2005) may give insight into the genetic mechanism for adverse responses

FIGURE 3 The effect of smoking on response to corticosteroids in asthma

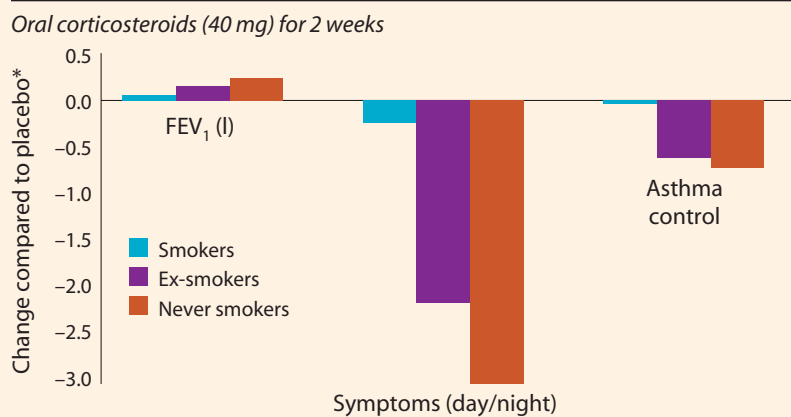
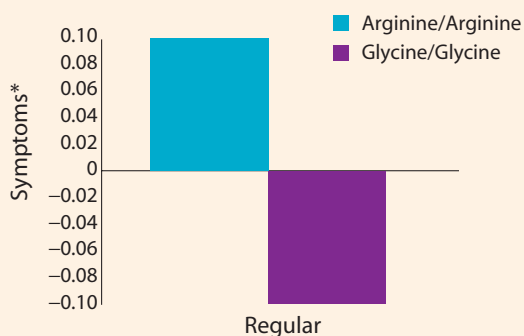


FIGURE 4 Genetic effects on response to asthma treatment



*Change from baseline.

Arginine/Arginine: 15% (25% in black population)

Glycine/Glycine: 33%

SOURCE: ISRAEL 2004

to beta agonists. In this study, a genetic polymorphism at amino acid residue 16 of the beta2-adrenergic receptor was examined (Figure 4). In terms of response, glycine-glycine (Gly-Gly) or even a heterozygote with glycine, tended to respond quite well to beta agonists. The arginine-arginine (Arg-Arg) polymorphism, however, actually results in increased symptoms and increased exacerbation rates. In general, the Arg-Arg polymorphism is found in about 15 percent of the general population, but it is found in about 25 percent of the black population. This may be a factor relative to increased rates of severe asthma exacerbations in the black population.

Conclusion

From the data discussed herein, it should become clear to managed care organizations that there is a need to pay more attention to asthma variability, with particular attention to be paid to the black population, environmental tobacco smoke exposure, and overweight and obese populations, because these factors might increase exacerbations and/or decreased response to therapy.

The data also underscore the need to better understand the interaction between the components of variability, environmental and genetic effects, response to therapy, and risk drivers. The ability to individualize a risk assessment so that asthma severity and control can be profiled, and those characteristics used to better define a therapy, is essential. Therapy, then, would be based on the driving factors of the disease, and response would be more easily predicted and monitored. By better profiling the disease, it should be easier to answer questions such

as: Is it that nonresponders are not taking their medicine, or that they have a severe form of asthma? Does the patient need more therapy? Does the treatment need to be adjusted?

Thus, there are multiple levels of response to asthma therapy. Variability of response to treatment is outcome-parameter specific. For instance, treatment with a beta-agonist will affect FEV₁ but may have no effect on resource utilization. Adjustments in therapy (possibly based on pharmacogenetics) also should be related to response to each outcome parameter. Finally, important outcomes may differ from person to person and are also a function of perspective (society, payer, clinician, family, patient). Therapy, therefore, should reflect outcomes that are important to both payers and patients.

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Managing Asthma in a Managed Care Setting: Strategies for Treatment and Control

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Managed care organizations face an increasing prevalence of asthma despite all interventions, including better therapeutic modalities and attempts to increase public awareness (Schoening 2004). It has been widely held that asthma is a problem for the elderly and people in lower socioeconomic groups. Asthma, however, is now a disease affecting all populations (Yawn 2001, Joseph 2000).

Asthma and the work force

The increasing prevalence of asthma in the active work force is causing a huge financial ripple effect for large corporations and small businesses in lost days due to absenteeism, with an accompanying loss of productivity and revenue. Corporations and businesses rack up costs for training replacement personnel, missed deadlines, quality assurance/target variance, and other direct and indirect costs. Presenteeism also can be a problem and poses a major financial burden for companies when employees show up at work but are less than maximally productive because they are sick.

According to the Asthma and Allergy Foundation of America, many asthma-related hospitalizations, emergency department (ED) visits, and missed workdays and school days could be avoided if patients had appropriate medications and medical management (AAFA 2005).

The National Committee for Quality Assurance *State of Healthcare Quality 2002* report states that asthma annually accounts for more than 10 million physician visits, more than 400,000 hospitalizations, more than 1 million ED visits, and about 10 million missed school days. Adults lose an estimated 3 million workdays annually because of asthma. In addition, more than 4 million sick days could be avoided each year if American workers with asthma had medication-management rates comparable to those seen among health plans at the 90th percentile of the Health Plan Employer Data and Information Set (HEDIS) measurement (NCQA 2004).

Data from telephonic asthma services. Companies that provide asthma health telephonic services cite a number of contributors to the growing costs and morbidity associated with asthma. Some of these include patients' lack of knowledge of asthma as a chronic condition, poor preparedness for asthma attacks, lack of an asthma action plan, and poor knowledge and use of peak

flow meters and spacers. Patients also may not seek medical care on a regular basis for their asthma. In addition, influenza and pneumococcal vaccines may not be viewed as beneficial, and there may be significant reluctance on the part of patients to join disease management programs.

Physicians and other health care providers say that their asthma patients are reluctant to consider asthma as a chronic condition. Despite proper instructions, patients often mix up their medications, do not take medications as prescribed (i.e., on time or the proper amount), or wait too long before seeking care when they experience exacerbations. They also cite productivity pressures as to why there may be a lack of education for patients. Many physicians clearly believe that asthma patients, like patients with such chronic diseases as diabetes, should be allotted longer appointment slots so that better asthma information and education can be provided.

Asthma staging — a missed opportunity

The National Institutes of Health/National Heart, Lung, and Blood Institute (NIH/NHLBI) guidelines indicate that asthma staging may present a significant missed opportunity: Patients are often treated for asthma under urgent/emergent conditions without benefit of staging (NIH 2002). There also may be a tendency with some health professionals to treat severe asthma with medications meant for milder forms of asthma. As a result, patients may be armed only with rescue medications, and not have the much-needed controller medications that help prevent or lessen the risk of a full-blown asthma attack. Patient follow-up for observance of medication administration technique and adherence has also proved challenging.

Choice of therapy does make a difference — it is a critical factor in determining treatment success. MCOs should ensure that their formularies include medications that are not only evidence based but also compliance friendly. All must shoulder the responsibility for improving asthma outcomes. Patients represent the largest stakeholders of all, but they do not always see themselves as decision makers or even partners in their own health care choices and outcomes.

The NIH clinical guidelines for asthma are important because they provide a road map for physicians and

other health care providers in prescribing the correct therapy or combination of therapies to treat a patient's severity of asthma. Health professionals not only need to prescribe adequately, they also must combine efforts to address other factors, such as exposure to triggers and medication adherence, and should develop and implement individualized asthma action plans for patients.

High Risk Asthma Program

The Blue Cross Blue Shield of Michigan High Risk Asthma Program (HRAP) was designed to manage risk factors aggressively, delay or prevent disease progression and related complications, improve pulmonary function, reduce or prevent acute exacerbations, and improve ability to participate in normal activities. We also hoped to have a positive effect on patient clinical measures, increase compliance with medical and pharmaceutical guidelines, reduce modifiable behavioral risk factors, and reduce overall costs.

The initial patients enrolled in HRAP were stratified into two categories based on health care usage: patients having 1 or more asthma-related inpatient admissions during the past 12 months, and patients with 2 or more asthma-related ED visits during the past 12 months. The program included follow-up telephone calls to members during a 12-month period and an in-home assessment conducted by a respiratory therapist. Patients were given educational workbooks, and mailings and an action path/treatment plan were developed.

Outcome measures included pulmonary function, body mass index, receipt of a flu shot and/or pneumonia vaccine, total missed workdays/school days, and development of an action plan. Inpatient admissions, ED visits, medications used, peak flow meter readings, inhaler use, smoking behavior, and physical-activity level.

Program results

In 2004, HRAP included 0.03 percent of total disease management cases. Thus, the number of asthma patients was extremely small. Approximately 75 percent of the cases were female. The average age of participants was 36 years. Among all of the health plan's enrollees, 0.01 percent were eligible for inclusion in the program and were contacted. Some of these eligible candidates were later determined to be medically inappropriate after the initial contact was made, however; of these, 41 percent of contacted candidates were enrolled.

Results showed that asthma symptoms were reduced for both adults and children. Lung function improved for those with initially poor scores. Total asthma-related medical costs were \$700 lower than those of the nonstudy participants. Outcomes included a 14 percent improvement in peak flow meter usage, a 21 percent increase in members not reporting chest tightness, a 50 percent decrease in the number of members reporting shortness of

breath many times daily, and a 10 percent decrease in members with interference in activities of daily living. Among adults, inpatient utilization was unchanged.

It also was shown that use of peak flow meters increased in the first 3 months but then decreased over time. Therefore, optimal use may be a function of disease severity.

Other results included statistically significant reductions in the frequency of asthma symptoms over time ($P < .05$) and a statistically significant lower percentage of patients overusing beta agonists ($P < .05$). There was a substantial impact on nighttime symptoms. Participants also were more compliant than nonstudy participants with respect to receiving an annual medical examination (80 percent versus 70 percent).

Program challenges

A number of limitations to the HRAP program are evident. First, many members were lost to follow-up; therefore, outcomes data are not complete, and there was difficulty in getting members to enroll. For many members, there was no asthma action plan in place. Members lacked an awareness of asthma triggers and how to avoid them. Improper use of and failure to carry inhalers was noted, as well as noncompliance with oral steroids and other medications. There was also poor use of peak flow meter and spacers. The challenges are to provide an incentive to read educational materials to complement telephonic support, and to provide more education to the primary care physicians.

Overall, program results showed a lack of understanding of the disease process and the seriousness of the disease, when to seek medical help, how to use controller and rescue medications, and the value of peak flow meter readings and flu and pneumococcal vaccines.

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Controlling Asthma Through Disease Management

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Disease management (DM) programs and care coordination strategies are increasingly utilized to help control health care costs for populations with chronic disease. Although it is not yet certain that these approaches will lead to a reduction in overall cost of care, it is increasingly evident that they can effect a shift in a population from acute episodic care to preventive care, improve patients' health status, and decrease the negative impact of a chronic health condition on overall quality of life.

Effective disease management shifts the utilization of health care resources where they are needed most. A small proportion of patients account for a large proportion of asthma-related health care expenditures — primarily for emergency and hospital-based care. Improving preventive care for patients with asthma would substantially reduce expenditures for this smaller number of patients and increase the allocation of resources to a larger population.

Shifting resources to preventive care

Shifting resources to preventive care may seem simple to do and even intuitive. In reality, however, this approach would require a fundamental change in the way that incentives are structured and health care is paid for in the United States. Although cost containment may be an immediate goal for stakeholders, the long-term health status of the population may be better served if financial incentives were realigned to promote effective preventive care rather than acute care.

Initially, the transition to disease management is likely to require a new commitment of resources to establish the needed operations. Experience suggests, however, that with time, an effective program will engage a large population in ongoing preventive care. Emergency department (ED) visits and hospital stays will be substantially reduced in the population of "high resource utilizers," and a larger population will use more outpatient resources.

Resource shifting has been successfully tested in Los Angeles, where the Los Angeles County Department of Health Services (LAC DHS), the Southern California Chapter of the Asthma and Allergy Foundation of America (So Cal AAFA), and the Los Angeles Unified School District have implemented the Breathmobile and Pedi-

atric Asthma Disease Management Program (PADMAP) to deliver ongoing preventive care to children with asthma at their school sites (Jones 2005). Programs like this clearly demonstrate that the willingness to commit resources and to align financial incentives with health outcome goals can shift a population to preventive care (Figure 1).

Current approach

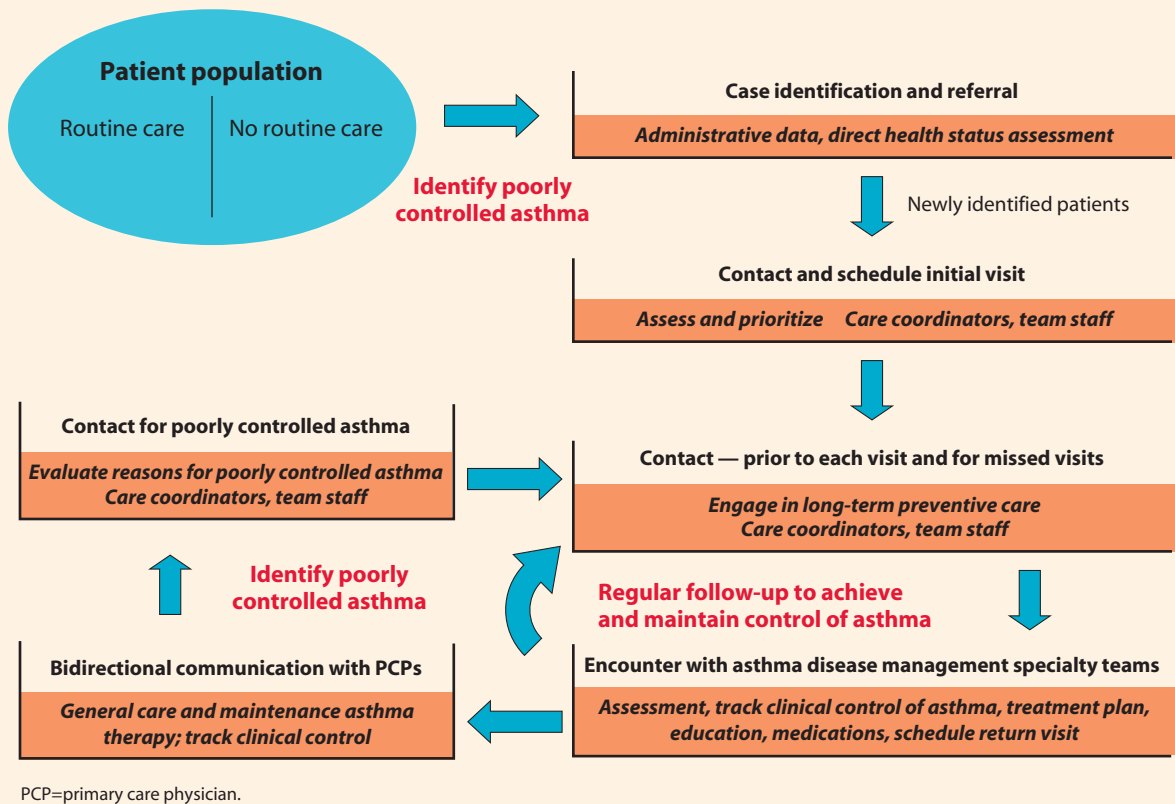
Health plans now spend a large amount of money on poorly controlled asthma, highlighted by the finding that about 10 percent of asthmatics account for about 80 percent of asthma care costs (Weiss 2001). Health care systems and hospitals are motivated to allocate a large proportion of their resources for emergency and inpatient care because reimbursement rates for this form of care are higher. At the same time, payments for scheduled outpatient visits are low and motivate outpatient providers to participate in a high volume of short visits, and to minimize staff-related costs. Furthermore, patients and providers are often faced with complex approval processes and high copayments that function as disincentives for expert preventive care and the medications required to control a condition like asthma. These payment and resource allocation patterns are also observed with government-supported health care programs such as Medicaid and Medicare (Shields 2004).

Disease management is a better approach

Controlling a patient's asthma requires a thorough assessment by health care providers of symptom patterns, disease activity, comorbid conditions, risk factors, and asthma triggers. It also requires the development of a daily management plan and a rescue plan, and repeated education so that patients and caregivers can utilize the management plan appropriately and monitor disease activity. For patients, it requires the frequency of visits that is necessary for the clinical team to evaluate response to therapy, modify management plans, reinforce education, and track whether patients are achieving and maintaining clinical control of their asthma. Long wait times for short visits to understaffed outpatient settings are not likely to engage patients in the complex and ongoing process of controlling asthma.

Patients in an asthma DM program benefit from im-

FIGURE 1 Disease management approach to asthma control



proved quality of life and, when they achieve the national definition of asthma “control,” improved health. They experience fewer symptoms and miss fewer days from school or work. Their risk for severe respiratory distress diminishes, and they need not use their emergency medications as often. The system — including payers — benefits because therapy affects a broader population with preventive care, alleviating the demands associated with hospitalization, emergency care, and unplanned acute-care episodes.

Identifying poorly controlled asthma

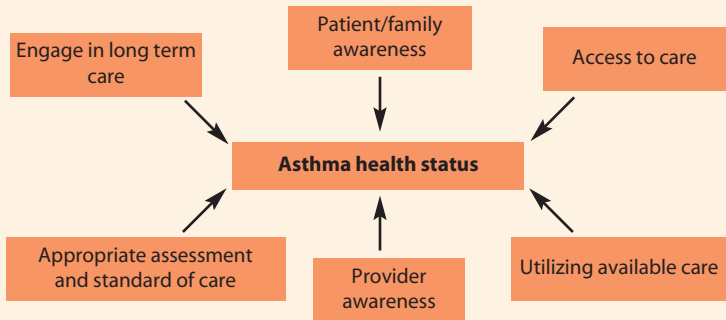
Improving asthma control begins with identifying poorly controlled asthma. Most health plans do not have an easy, effective method of identifying these patients before they surface in the ED or clinic for costly treatment.

Also, current third-party payment patterns do not encourage health plan representatives, office staff members, nurses, doctors, or patients to spend

the considerable time and effort necessary for accurate case identification. Cost-effective methods are needed to identify poorly controlled asthma, ideally utilizing systematic approaches that can evaluate large populations efficiently and provide an opportunity for targeted preventive care and careful patient tracking sooner rather than later (Figure 1).

Validated surveys are available that can help identify *continued on page 22*

FIGURE 2 Barriers to effective asthma care



The Los Angeles Pediatric Asthma Disease Management Program (PADMAP)

PADMAP was initiated in 1996 with a single mobile clinic (Breathmobile) based at the LAC+USC Medical Center. It served 18 schools and 3 Los Angeles County Comprehensive Health Centers returning to each site every 4 to 7 weeks, depending on caseload. Today, four Breathmobiles deliver care at about 90 sites in the Los Angeles area.

Rather than requiring patients to travel to a clinic, the Breathmobile program efficiently brings coordinated health care to the at-risk population, offering asthma care to every student, regardless of participation in a health plan. In no case is care limited, nor is any family billed for any cost; all obvious disincentives for participation and barriers to care (Figure 2) are eliminated.

The program was designed to:

- Identify active asthma in a large urban lower socioeconomic population at multiple school and clinic sites
- Provide families with easy access to *ongoing regular* preventive care in accordance with national standards, a different standard for “access to care” than the commonly applied measure of health plan membership
- Utilize care coordination and patient tracking to optimize family participation in ongoing preventive care
- Shift the pattern of resource utilization in the population from acute/episodic care to preventive care
- Provide thorough care at each visit in accordance with national standards, including an assessment of clinical control of asthma
- Develop an infrastructure for sustainable population-based health service that incorporates disease management (DM) principles and routine evaluation with program improvement

With four units operating at multiple sites, the collaborators realized an opportunity to establish a more comprehensive DM program by making certain adjustments, including:

- Establishing an information system to track patients closely and to maintain easily accessed clinical medical records and easily manipulated data
- Replicating the health care flow and process from the Breathmobile to the Allergy & Immunology clinic at the LAC+USC Medical Center
- Introducing elements of care coordination and a care coordination center at the LAC+USC Medical Center

- Establishing performance measures and a routine process of program evaluation and improvement
- Developing a computerized kiosk-based survey method to identify active asthma, poorly controlled asthma, and moderate-to-severe disease activity in primary and specialty care clinic settings

Identifying asthma

PADMAP employs several methods to identify asthma cases:

- Direct referrals from the school nurses
- Referrals from physicians and clinics
- Response to fliers that teachers hand to students to take home
- Use of a validated one-page questionnaire that is sent home to families (returned surveys are scanned and scored by a computer, which generates a report of the children in each classroom that are likely to have active asthma)

The most simple and efficient method of communicating with parents is the flier. When they learn about the program, many parents contact the school nurses to have their child evaluated in the Breathmobile. Each school nurse works with the Breathmobile staff to schedule appointments.

To encourage participation, the Breathmobile staff calls each family one to two days prior to the child’s appointment as a reminder. Implementing this simple effort has consistently been associated with an increase in show rates and maintenance of ongoing participation.

Assessing asthma severity

Each Breathmobile is staffed with a team of asthma care specialists, including an allergist, nurse, respiratory therapist, and patient service worker. Students flow through a structured health care encounter that includes:

- Thorough assessment — evaluation of disease activity, day and night symptom frequency, bronchodilator use, seasonal patterns, disease-related morbidity, comorbid conditions, exposures, and triggers
- Allergen skin testing
- Lung function testing, as appropriate

The patient service worker also assists each family to identify health care resources and eligibility.

TABLE 1 Utilization: asthma outreach program vs. MediCal

| | Treatment group (n=232) | | | Comparison group (n=89,563) | | |
|--------------------------|----------------------------|----------|--------|--------------------------------|----------|--------|
| | Pre | 1st year | | Pre | 1st year | |
| Inpatient days | 45 | 31 | -31.1% | 18,564 | 15,246 | -17.9% |
| Emergency room visits | 159 | 141 | -11.3% | 51,495 | 48,086 | -6.7% |
| Outpatient health visits | 256 | 766 | 199.2% | 56,566 | 51,963 | -8.6% |
| Outpatient clinic visits | 1,365 | 1,190 | -12.8% | 674,081 | 698,473 | 3.6% |

TABLE 2 Prescription fill patterns: Asthma outreach program vs. MediCal

| | Treatment group (n=232) | | | Comparison group (n=89,563) | | |
|-------------|----------------------------|----------|--------|--------------------------------|-------------|-------|
| | Pre | 1st year | | Pre | 1st year | |
| Controllers | 268 | → 740 | 176.1% | 50,592 | → 53,071 | 4.9% |
| Relievers | 690 | → 798 | 15.7% | 200,035 | → 208,576 | 4.3% |
| Other | 7,676 | → 8,225 | 7.2% | 3,960,419 | → 4,470,571 | 12.9% |

Treatment plan

Following assessment, a physician develops a treatment plan in accordance with national standards. This plan includes education about avoidance measures and a daily management plan, with heavy emphasis on educating patients and families how to implement the plan.

The goal is to have caretakers/patients demonstrate which of their medications are asthma controllers (regular use), which are relievers (for acute episodes), and how to use them appropriately. An effort is made to help families understand the clinical goals of therapy, learn what is important to the family and patient, and to motivate the family as a support system for the patient.

Using the National Institutes of Health asthma guidelines to form a construct defining "clinical control" of asthma, the Breathmobile physician assesses clinical control and degree of disease activity at every visit and adjusts the intensity and frequency of follow up necessary to achieve and maintain control. Monitoring is conducted at the schools and clinics and, between visits, by telephone, whenever patients need help.

Data management

In 2001, Loran Clement, MD, one of the program physicians, developed an electronic medical records/database system called AsmaTrax. This system

serves as an efficient point-of-service clinical tracking system for care coordinators to manage referrals and complex cases, and eliminates the need to handwrite and photocopy daily management plans, treatment plans, prescriptions, and educational materials, allowing the care team to spend more time teaching and talking with patients. AsmaTrax also delineates trends and changes over time, so the care team can adjust therapy on the basis of each patient's progress or lack of it.

The PADMAP data management center, through the support of the Southern California chapter of the Asthma and Allergy Foundation of America, includes an analyst who collects, collates, and administers the burgeoning mass of information, allowing a continual cycle of program improvement.

Results

In the first year, of the 696 children enrolled in the program, about 300 were enrolled in MediCal, California's Medicaid program. At the end of the first year, MediCal utilization and medication data were available for 232 children for a 2-year period, the 12 months prior to enrollment (receiving only MediCal services), and for the first 12 months that they received care through the Breathmobile. Claims for asthma-related inpatient days and emergency room visits decreased, but claims for outpatient visits increased (Table 1), and the controller-to-reliever prescription ratio improved (Table 2). These

continued on page 22

The Los Angeles Pediatric Asthma Disease Management Program (PADMAP)

continued from page 21

improvements were not seen in a matched group receiving usual care.

In 2002, all four Breathmobiles received accreditation from the Joint Commission on Accreditation of Healthcare Organizations as a disease-specific care program, becoming the first program in the United States to receive this accreditation. By 2004, the JCAHO disease-specific care accreditation included the Allergy & Immunology Clinic and Care Coordination Center at the LAC+USC Medical Center and the four Breathmobiles. Each service area utilizes the same care-delivery model and clinical tracking and data system.

In 2005, the program is providing ongoing preventive care at the LAC+USC Medical Center and at the approximately 90 schools and 3 county comprehensive health centers.

The next step, in 2005, will be to integrate the general pediatric clinics at the LAC+USC Medical Center into the DM program. Additional kiosks are being installed so that parents and patients can ask questions prior to seeing their physician. The answer patterns are scored with a series of scoring algorithms, and a report is printed for the family and physician, which states three important things: 1) whether the patient is likely to have active asthma (case identification); 2) whether the asthma is likely to be uncontrolled at this time; and 3) whether the patient is likely to have moderate-severe disease activity at this time. The report also summarizes the answer patterns and provides brief suggestions to help improve control of asthma, if indicated by the answer patterns. This report is one means of providing important information to assist both the family and the physician during the encounter. It also provides a systematic method to identify and track poorly controlled asthma, and a structured framework for referral to specialty care services in the DM program.

The longstanding collaboration, spearheaded by the Southern California chapter of the Asthma and Allergy Foundation of America and the willingness of the LAC DHS to realign its financial incentives to support outpatient preventive care, provide the opportunity for motivated partners to establish an asthma DM program for lower socioeconomic populations over a wide area. This, in turn, has led to improved control of asthma in the population, and a shift in the pattern of utilization from episodic to preventive care.

poorly controlled asthma, such as the Asthma Control Test (Nathan 2004), Asthma Therapy Assessment Questionnaire (Skinner 2004), and Asthma Impact Survey (QualityMetric 2004). It is important to note, however, that these surveys have been validated to identify poorly controlled disease in patients known to have asthma, but not to identify cases of asthma in general populations.

A systematic population-based approach could include a simple method to identify active cases of asthma (known and unknown) in the general population, and whether the asthma is uncontrolled. In the Los Angeles PADMAP, a survey previously validated for case identification has recently been validated to identify uncontrolled asthma as well as moderate-severe disease activity (Jones 2004). Software has been developed so that survey answers can be entered into a computer and scoring algorithms applied. Health plans now can survey new enrollees during intake calls, with the plan representative putting information in a computer and positive reports automatically transmitted to care coordinators. Existing patients can be identified in clinic settings with a kiosk setup, where reports are printed for patients before they see a provider.

Treating to achieve and maintain clinical control of asthma

Asthma is similar to other chronic health conditions (e.g., diabetes) in that a structured health care delivery process may be most effective in helping patients to achieve and maintain clinical control. National guidelines have outlined the goals of therapy and recommended treatment standards to achieve those goals (NIH 2002, NHLBI 1997). Current guidelines suggest that patients can achieve these goals with routine care in the primary care setting, but many patients do not. This is why it is important to establish a systematic approach to identify active disease and to evaluate asthma control in the primary care setting. Once identified, patients with poorly controlled asthma, despite routine care, should have unhindered access to a health care process that is structured for chronic disease management.

A structured, systematic approach should include regular visits, careful assessments and tracking of patient health status and outcomes, periodic adjustment of treatment plans, education to reinforce the patient's understanding and implementation of the management plan, and care coordination to optimize participation in ongoing care and to provide the patient additional assistance with difficult-to-control asthma. In general, health status is improved and morbidity is reduced in populations that are enrolled in programs that apply these disease management elements.

Clinical control of asthma, based on National Institutes of Health (NIH) guidelines, would indicate the following goals for therapy:

- Symptoms no more than 2 days per week and no more than 2 nights per month on recall of 2 to 4 weeks
- No severe flare-ups since the previous visit, which means no ED visits, inpatient visits, or oral corticosteroid use
- Normal (for the patient) lung function
- No limitation of activities or exercise due to asthma

At each visit, it is important to determine whether patients with asthma meet these criteria, and to adjust treatment plans for those who do not. Tracking this outcome over time, and having the longitudinal pattern easily available at the time of an encounter, can provide a useful parameter for guiding individual patient care. It is also an important method for evaluating the impact of a health care intervention in a population, and to guide program improvement.

Difficult-to-control asthma

Generally, it has been assumed that if providers follow the NIH asthma guidelines and put every asthmatic on a standard treatment protocol, they would achieve and maintain asthma control and, further, that poor health outcomes would result from inadequate care by providers and patient noncompliance.

The real picture turns out to be far more complex. Undertreatment and lack of patient adherence to a treatment plan do not fully account for the persistence of high rates of poorly controlled asthma. At a biological level, variable response to standard controller therapies may be influenced by an individual's genetics (Tantisira 2005). Furthermore, it is important to reconsider the way in which health plans currently influence provider adherence with guidelines and patient adherence with treatment plans. Health plans often provide disincentives for patients to access specialty care on a regular basis. The complexity of successful asthma care, however, requires that health plans provide an incentive for patients to receive thorough and well-structured care in a manner that is similar to other chronic health conditions. Otherwise, it is unreasonable to expect that providers will deliver and patients will receive thorough care, appropriate management plans, and the regularly reinforced education that is necessary to change long-term behavior patterns.

Tracking response

Once a patient has been put on a treatment protocol, it is important that providers and health plans track response to therapy, using structured methods to assess ongoing clinical control, to identify nonresponders, and to adjust therapy.

Ideally, asthma control should be part of a broader system that identifies and tracks other chronic conditions,

including obesity, risks for diabetes, congestive heart failure, and stroke. The tracking system should be dynamic, identifying patients with poorly controlled asthma at all points — entry into the DM program, follow-up by the primary care physician, and follow-up by the specialty care provider — so providers can adjust therapy.

Asthma control team

Physicians, nurses, case managers, and respiratory therapists should be on the asthma-control team to ensure that every patient receives comprehensive care, with follow-up conducted on a regular basis until it is clear that the patient understands the disease and has control of it.

Thorough patient education is vital to success. The patient should be taught about environmental control measures to reduce allergens and other triggers; the importance of following a daily management plan, including a focus on pharmacotherapy; the proper technique for using the medication; and a rescue plan should the asthma worsen.

Close follow-up, to reinforce education, is also important, and should be provided with the frequency that is necessary for each patient to achieve and maintain clinical control. Education should also extend to relatives, caregivers, and any individual who can help the patient comply with the regimen, ensure proper use of medication, and help implement the rescue plan when (and if) necessary.

Advanced therapeutics

Because asthma is a syndrome and not a single disease, response to therapy is variable. It is well established that some asthmatics — perhaps 30 percent or more — simply will not respond to the mainstay of therapy, inhaled steroids. Even after many rounds of therapy adjustment, a group of patients with difficult-to-control asthma will remain, as part of a standard distribution curve. These persons will need advanced therapy.

One example of an advanced therapeutic is allergen immunotherapy, which is individually engineered based on the patient's own allergies. Another example is anti-immunoglobulin E, such as the biologic omalizumab (Xolair), a recombinant humanized monoclonal antibody.

These therapies may be expensive, but under a health care system that does not employ an asthma DM program, treating difficult patients is already extremely costly and, despite the expense, treatment is not very effective. By identifying patients who are nonresponders to conventional therapy and targeting them for advanced therapy, these newer agents can be put to appropriate, clinically effective, and cost-effective use. Considering the costs of ineffective therapy, effective therapy may actually reduce costs in difficult-to-control asthma cases.

Conclusion

Currently, the typical approach to asthma fails to control active disease or limit morbidity for many patients. Rescue and emergency care are available to almost everyone, however, thorough preventive care is much harder to come by.

An asthma DM program — especially one that is part of a comprehensive chronic disease DM program, delivered by a coordinated care team, and supported by an excellent control-tracking system — will put health care resources to more efficient use, reduce costs for patients where there is a high level of morbidity, improve patient health, and identify those patients with the most difficult-to-treat asthma to ensure that advanced therapeutics are appropriately targeted.

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DISCUSSION

How Do We Get Control of Asthma?

UNCONTROLLED ASTHMA IS COSTLY

ALLAN T. LUSKIN, MD: The analysis of the TENOR database brings up a question that I think frustrates health care providers and highlights a problem for health care planners — namely, we are still measuring outcomes in terms of silos. Questions remain: Are we getting to a stage where health care planners and health plans can look at total disease costs as opposed to simply drug acquisition costs? And, can we use health economic data to begin making decisions at a global level?

SEAN D. SULLIVAN, PHD: Yes. When we buy any technology, whether it's a drug or a device or a test, we should assess the extent to which that technology brings better health to our population, what the risks are, and the extent to which that technology allows us to be more efficient. We are essentially looking at the ability to either replace existing technology, reduce morbidity, or reduce the number of treatment failures. If we believe in that framework, it is important for us to evaluate all costs.

LUSKIN: How far along do you think we are?

SULLIVAN: It is clear to me that CMS [Centers for Medicare and Medicaid Services] will rely on managed care plans to aid in technology assessment and to determine value in a broad way. I also have a sense that on the reimbursement side for nondrug technologies, CMS is extremely interested in cost effectiveness.

KEVIN B. WEISS, MD, MPH, MS: During a recent meeting that I attended in Washington on performance measurements held by CMS, [CMS Administrator] Mark McClellan made it clear that efficiency is key. He used the “e” word 3 times for every time he used the “i” word — efficiency, efficiency, efficiency, and then improvement. The reason CMS is so concerned with this issue, and probably no different from any large employer purchaser, is that if they cannot figure out how to improve through efficiency, they are going to have to go to a cost-containment model, which could be draconian. So, trying to find efficient ways to cut costs puts a value concept front and center. Efficiency also needs to be tied to an outcome, as using efficiency to mean costs becomes problematic.

LUSKIN: Doesn't that mean that we have to get better at measuring the appropriate outcomes? Measuring hospitalizations and emergency department visits is pretty easy. What happens when we try to evaluate our therapies by looking at real measures of productivity — which, if we look at presenteeism, may be as important from a dollar point of view as hospitalizations, and

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certainly more important than absenteeism? If we are not measuring improvement there, then we may be making wrong decisions, particularly as we begin to shift the burden of cost to the patient.

GWENDOLYN H. PARKER, MD: One challenge that we have from a managed care plan's perspective is obtaining the needed data. We have the claims for utilization and for prescriptions, but not all members have prescription coverage. One problem is that physicians do not track their patients. They often do not have IT [information technology] systems in their practices. So, it is especially nice to hear about the TENOR study. A caveat with the TENOR study may be that it looks at a segment of patients that may have a greater interest in their own asthma and health. Most of your cost is going to come from people who do not necessarily see themselves as stakeholders in their own health care and do not necessarily access their physicians. Likewise, their physicians do not necessarily reach out. Sometimes, there is no proactive participation by patients or providers. So, we also need to work more on making patients and providers proactive in terms of patients becoming stakeholders, and in terms of physicians supplying the necessary data to planners.

COST INCENTIVES FOR TREATING ASTHMA

LUSKIN: Do primary care physicians or health plans see all asthmatics as being similar and treat them alike?

CRAIG A. JONES, MD: The assumption that providers can evaluate control in a routine office visit and do a thorough job of taking care of asthma is one that has been present for a long time. And the concept that dissemination of guidelines will give providers the tools and the knowledge to do that is, I think, fundamentally flawed. In practice, most providers are paid for 7- to 11-minute office visits and see 30 or 40 patients a day. Providers are expected to include a thorough assessment of control, a thorough education process with the

staff, and development and teaching of a daily management plan. If we examine what it takes to do this in one encounter, I believe we have a fundamentally misaligned system. Secondly, the incentives are all wrong. My hospital gets paid by Medicaid to put a patient in a bed overnight but not for the very complex outpatient preventive care visit that would have kept the patient from coming to the emergency department. Therefore, all the resources of my organization, which is a large health care organization, are being used to allow people to come into beds and emergency departments. Here, I would argue, is where the financial and health incentives are completely misaligned.

PARKER: I agree with that assessment regarding time constraints that physicians have and the reimbursements for hospitalizations. This is where case management comes into play. We want to provide services in a more cost-effective environment. So, the plans need to change the strategy in terms of managing cases.

WEISS: About 6 months ago, we published the results of a large clinical, randomized trial looking at guideline implementation that asked the simple question: can you just educate the physicians, or do you need to actually do systems change?* We found that a small improvement in outcomes can be obtained with physician education, but a bigger bump can be obtained with systems change. But, even with systems change, and with a dedicated asthma nurse specialist working in the practice and standardized assessments being done with the help of computer-assisted assessments, — and also with patient telephone follow-up and preventive care — mild-to-moderate asthma still is not well controlled. It can be improved, but not really controlled. Another part of the study examined cost effectiveness, and we found that it may be more cost effective to do physician education, because it is very cost efficient to deliver good guideline-based care. But even with good guideline-based care, optimal control is not being seen.

So, we are far from being able to control asthma in most patients, and, in fact, the mechanisms for a comprehensive care process are not very efficient yet. I think the TENOR data are another lever in trying to understand where the potential value might lie in improving asthma care, and I think it is in those large numbers of indirect costs.

RISK ASSESSMENT IS CRITICAL

JONES: How should physicians be educated to estimate the severity of asthma?

* Sullivan SD, Lee TA, Blough DO, et al. A multisite randomized trial of the effects of physician education and organizational change in chronic asthma care: cost-effectiveness analysis of the Pediatric Asthma Care Patient Outcomes Research Team II (PAC-PORT II). *Arch Pediatr Adolesc Med.* 2005;159:428–434.

WEISS: The literature demonstrates that patients are much more likely to be put on inhaled corticosteroids if it is the physician who perceives severe asthma as opposed to the patient's perception as having severe asthma. So, these perceptions layer the complexity. Estimation of asthma is difficult, particularly due to the translation between patient and physician of asthma symptoms and how those symptoms affect quality of life.

LUSKIN: Overall, physicians tend to underestimate the severity of asthma. Severity correlates only somewhat with other outcomes. FEV₁ correlates very poorly with other outcomes that are important both to patients and to MCOs. Adherence is also clearly a problem, as are comorbidities. When we talk about problems in achieving control, the TENOR data suggest that there is a patient population with difficult-to-control asthma, and standard therapy is not likely to get their asthma under control, even if it is mild. There is variability in response to therapy, which is something that Jann [Caison-Sorey] brought up several times. Patients also do not control their environmental triggers, which is quite clear whether we talk about tobacco smoke, animal dander, or cockroaches. There are different patterns and perceptions of asthma symptoms. There is also a sense of defeatism among some patients and caregivers, where they accept a lower quality of life simply because the patient has had uncontrolled asthma for a while.

So then, we have undertreatment, underdiagnosis, and a failure to assess a patient's risk. A physician's ranking of underlying severity that does not correlate well to symptom severity and other factors (adherence, variability, triggers, etc.) adds to the complexity of severity.

ASTHMA IN A MANAGED CARE SETTING

LUSKIN: How can health plans urge members with asthma to realize the seriousness of their disease?

PARKER: Providers and health plans need to be more active when it comes to educating patients about when to seek medical help or how to use their rescue medication. We need to educate them better about the value of peak flow meter readings. Also, providers need to put an asthma action plan in place and work with the patient on it.

WEISS: This situation with asthma is similar to the situation with diabetes. I am working with a group on diabetes action plans for practices in Pennsylvania. We actually call patients and ask them, "On your last visit, or in the past year, have you talked with your doctor about a diabetes plan?" Only 10 percent actually had a plan for how to manage their diabetes. So, this is more of an endemic problem of physicians not knowing self-management skills.

LUSKIN: Are there things that a managed care system could do that would facilitate being a good patient and being a good physician? More usable pharmacy reports would be one example. There are other simple things. There is a lack of communication between urgent care offices, EDs in hospitals, and the primary care office. This is an area that a managed care system could facilitate.

T. JANN CAISON-SOREY, MD: For us, a healthy patient means a person who has improved health outcomes, and who already has decreased hospitalizations and decreased ED visits. Better outcomes reserve money for us to do other innovative things that the literature has shown we could accomplish. But the cost of care is expensive, and it is extremely difficult to look at innovation. If someone has a wonderful pilot that they have done, how do you put it into action? And where does the money come from? These are the challenges that managed care plans face.

LUSKIN: How do the National Committee on Quality Assurance and HEDIS help plans raise the quality of their asthma programs? What could be done differently?

CAISON-SOREY: If we look at NCQA statistics, asthma annually accounts for more than 10 million physician visits, over 400,000 hospitalizations, more than 1 million emergency department visits, and about 10 million missed days from school. Unlike other disorders, asthma has a huge effect in terms of direct cost. According to the NCQA's *2002 State of Health Care Quality Report*, more than 4 million sick days could be avoided each year if American workers with asthma had medication management rates comparable to those seen in health plans with 90th percentile HEDIS measurement. Using the HEDIS quality measurements is one of the few ways that MCOs have to ensure that good medicine, based on evidence-based literature, is being delivered. Also, if we were able to properly diagnose asthma in patients who come into our offices for the fourth, fifth, or sixth time wheezing, or having a respiratory event, I think that diagnosis would drive a change in how we apply treatment.

ASTHMA MANAGEMENT AND PREVENTIVE CARE

LUSKIN: Do you believe that you can use a disease management program in the workplace similar to the one that was successful in the Los Angeles schools?

JONES: Yes, I do. The model can work anywhere there is an asthma population to be seen. We see adults at the Los Angeles County Comprehensive Health Centers, and we often take care of parents of children we treat at school and clinic sites. About one tenth of our pa-

tients are adults. This was not originally intended, but that's how it has evolved.

PARKER: When treating adults, what is the relationship with their primary care physician (PCP)?

JONES: Care for asthma in a DM program should not occur in isolation. We encourage our patients to remain in ongoing care with their PCP and often identify other health care concerns they should address. Our clinical tracking system prints out summary letters and copies of treatment plans for patients and their PCP. This has become a portal of entry not just for asthma, but for any other condition we find and needs treatment. The magic is in getting patients to engage in care regardless of whether they enter through an asthma door or a primary care door.

WEISS: When you say asthma patients in the DM program "engage in care," do most of them already have a health care point of contact?

JONES: There's a difference between *having access to care* and *engaging in care*.

Eighty percent of our patients have access, but are not engaging in regular care. If we can get patients to engage in ongoing preventive care for asthma, then we are changing behavior patterns in a way that may have a broader impact. To improve the likelihood that patients will show up for their appointments, we contact them to remind them about their appointment one or two days before each scheduled visit and to reschedule missed visits. We carefully track asthma activity, morbidity, and clinical control. Patients receive a thorough assessment, a treatment plan that includes a daily management plan, education, and medication if they don't have readily available access to fill a prescription. When we find other health conditions that need attention, we encourage follow-up and help patients schedule visits with their PCPs for those conditions, including asthma. And we provide them with information to help their PCPs fully understand their patients' health situation.

CAISON-SOREY: How are providers educated about this program? Are you partnering with providers when you deliver care to their patients?

JONES: We partner as much as we can. We designed a system to produce a summary report on our findings with recommendations for the PCP. We found that mailing, faxing, or phoning in reports to the PCP did not work — having patients carry the report when they see their PCP does work. We get many calls from PCPs saying that the medication we prescribed is not on their formulary and asking if they can make a substitution. We have had very few calls from PCPs who are upset about our seeing their patients — just a handful over the years.

CONTINUING EDUCATION POST-TEST

MANAGED CARE BEST PRACTICES IN THE TREATMENT AND MANAGEMENT OF ASTHMA

Please tear out the combined answer sheet/evaluation form on page 29. On the answer sheet, place an X through the box of the letter corresponding with the correct response for each question. There is only one correct answer to each question.

- 1. NIH data show that annual costs for patients with uncontrolled asthma are approximately:**
 - a. \$500 to \$1,000 per year.
 - b. Less than \$500 per year.
 - c. More than \$5,000 per year.
 - d. \$1,000 to \$5,000 per year.
- 2. Medications account for most of every dollar spent on asthma care. The second highest cost is for:**
 - a. Physician services.
 - b. Outpatient services.
 - c. Hospitalizations.
 - d. Emergency department visits.
- 3. The TENOR registry showed that control for patients who had moderate-to-severe asthma could not be achieved for:**
 - a. 85 percent of patients treated.
 - b. Less than 50 percent of patients treated.
 - c. Any patients treated.
- 4. Asthma variability, which affects treatment, can be attributable to:**
 - a. Differences in lung responsiveness.
 - b. Geography and seasonal variations.
 - c. Gender.
 - d. All the above.
- 5. Patients tend to perceive their asthma severity as lower than it really is.**
 - a. True.
 - b. False.
- 6. A patient's FEV₁ score is a good indicator of asthma severity.**
 - a. True.
 - b. False.
- 7. The MIAMI study showed that mild asthma:**
 - a. Is more prevalent.
 - b. Can initiate severe exacerbations.
 - c. Can be easily controlled.
- 8. Studies show that adherence to therapy is maintained by what percentage of patients following treatment initiation?**
 - a. More than 60 percent.
 - b. 50 to 60 percent.
 - c. Less than 50 percent.
- 9. The current asthma management pathway shows that treatment compliance rates for patients with asthma are:**
 - a. 65 percent.
 - b. 90 percent or more.
 - c. Less than 50 percent.
- 10. Bronchial hyperactivity and reversible airflow obstruction are reliable predictors of response to therapy.**
 - a. True.
 - b. False.
- 11. The presence of symptoms, such as wheezing, is key to determining severity of asthma.**
 - a. True.
 - b. False.
- 12. Successful control of asthma is most dependent on:**
 - a. Accurate diagnosis.
 - b. Adherence to a medication regimen.
 - c. Control of symptoms.
 - d. All the above.
- 13. The dominant risk factors that affect asthma treatment outcome are:**
 - a. Tobacco smoke.
 - b. Race and genetics.
 - c. Obesity.
 - d. Gender.
- 14. Growing costs and morbidity associated with asthma in the workplace are due to:**
 - a. Worker lack of understanding of asthma as a chronic condition.
 - b. Poor recognition of asthma triggers.
 - c. Improper use of medications.
 - d. All the above.
- 15. From a managed care perspective, asthma therapy is most valuable when:**
 - a. Medications are evidence based.
 - b. NIH/NHLBI guidelines are followed.
 - c. Medications are compliance friendly.
 - d. All the above.
- 16. The major advantage of an asthma disease management program is that it:**
 - a. Spreads financial responsibility among patients and payers.
 - b. Addresses issue of presenteeism.
 - c. Reduces treatment costs for low-income patients.
 - d. Emphasizes preventive care and control.
- 17. Poorly controlled asthma in patients can be more cost-effectively identified by:**
 - a. Use of validated patient surveys.
 - b. More frequent patient follow-up visits.
 - c. FEV₁ testing.
 - d. Telephone interviews.
- 18. A successful asthma management program also will include:**
 - a. Response-to-therapy tracking.
 - b. Advanced therapy.
 - c. Identification of other chronic conditions, such as obesity and diabetes.
 - d. Attention to NIH guidelines.
 - e. All the above.

CONTINUING EDUCATION ANSWER SHEET/EVALUATION/CERTIFICATE REQUEST
MANAGED CARE BEST PRACTICES IN THE TREATMENT AND MANAGEMENT OF ASTHMA

CE Credit for Physicians/Pharmacists

Sponsored by

The Chatham Institute

I certify that I have completed this educational activity and post-test and claim (please check one):

- Physician credit hours
- Pharmacist contact hours

Signature: _____

PLEASE PRINT CLEARLY

First name, MI _____

Last name, degree _____

Title _____

Affiliation _____

Specialty _____

Mailing address _____

City _____ State _____ ZIP _____

Daytime telephone (____) _____

Fax (____) _____

E-mail _____

Physician — This activity is designated for a maximum of 2.0 category 1 credits toward the AMA Physician’s Recognition Award.

Pharmacist — This activity is approved for 2.0 contact hours (0.200 CEU).

ACPE Universal Program Number (UPN): 812-000-05-009-H01
 Release date: Aug. 15, 2005
 Expiration date: Aug. 15, 2006

To receive credit, complete the answer sheet/evaluation form and mail or fax it to:

The Chatham Institute - 0166CGN
 26 Main Street, 3rd Floor
 Chatham, NJ 07928
 Fax: (973) 701-2515

Please allow up to 6 weeks for processing.
 0166CGN

EXAMINATION: Place an X through the box of the letter that represents the best answer to each question on page 28. There is only ONE correct answer per question. Place all answers on this form:

| | A. | B. | C. | D. | E. |
|-----|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 4. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| 6. | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| 7. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 8. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 9. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 10. | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| 11. | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| 12. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 13. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 14. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 15. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 16. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 17. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 18. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

PROGRAM EVALUATION

So that we may assess the value of this self-study program, we ask that you please fill out this evaluation form.

Have the activity’s objectives been met?

1. Describe the prevalence, costs, and quality-of-life issues related to asthma. Yes No
2. Describe the challenges in evaluating and differentiating among levels of asthma. Yes No
3. Explain the treatment options for controlling asthma, and compliance and adherence issues. Yes No
4. Explain the importance of assessing risk factors that contribute to control of asthma. Yes No
5. Discuss the challenges facing managed care organizations in controlling asthma. Yes No
6. Recognize the value of a disease management program to control asthma. Yes No

Was this publication fair, balanced, and free of commercial bias? Yes No

If no, please explain: _____

Did this educational activity meet my needs, contribute to my personal effectiveness, and improve my ability to:

- Strongly Agree*5
- Agree*.....4
- Neutral*.....3
- Disagree*2
- Strongly Disagree*1

Treat/manage patients?
 5 4 3 2 1 N/A

Communicate with patients?
 5 4 3 2 1 N/A

Manage my medical practice?
 5 4 3 2 1 N/A

Other _____

 5 4 3 2 1 N/A

Effectiveness of this method of presentation:

| <i>Excellent</i> | <i>Very good</i> | <i>Good</i> | <i>Fair</i> | <i>Poor</i> |
|------------------|------------------|-------------|-------------|-------------|
| 5 | 4 | 3 | 2 | 1 |

What other topics would you like to see addressed? _____

Comments: _____

