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Asthma Management Guidelines: Updates, Advances, and New Options

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Supplement Policy Statement

Standards for Supplements to the *Journal of Managed Care Pharmacy*

Supplements to the *Journal of Managed Care Pharmacy* are intended to support medical education and research in areas of clinical practice, health care quality improvement, or efficient administration and delivery of health benefits. The following standards are applied to all *JMCP* supplements to assure quality and assist readers in evaluating potential bias and determining alternate explanations for findings and results.

1. Disclose the principal sources of funding in a manner that permits easy recognition by the reader.

2. Disclose the existence of all potential conflicts of interest among supplement contributors, including financial or personal bias.

3. Describe all drugs by generic name unless the use of the brand name is necessary to reduce the opportunity for confusion among readers.

4. Strive to report subjects of current interest to managed care pharmacists and other managed care professionals.

5. Seek and publish content that does not duplicate content in the *Journal of Managed Care Pharmacy*.

6. Subject all supplements to expert peer review.

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Target Audience

Pharmacists, physicians, and other managed health care providers involved in asthma management

Learning Objectives

Upon completion of this activity, participants will be able to

1. define the burden imposed by uncontrolled asthma,
2. describe the National Asthma Education and Prevention Program (NAEPP) definition of asthma severity and issues that surround the diagnosis of asthma,
3. summarize the NAEPP treatment algorithm for asthma management and the place of asthma control as a treatment goal,
4. define asthma control and describe office-based measures for evaluating asthma control,
5. describe how the proposed 2007 NAEPP asthma guidelines will alter the definition of asthma and the treatment algorithm for the management of asthma, and
6. describe the role of managed care organizations in fostering evidence-based asthma management.

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Asthma Management Guidelines: Updates, Advances, and New Options

Robert P. Navarro, PharmD; Kenneth L. Schaecher, MD, FACP; and Gary K. Rice, RPh, MS, MBA

ABSTRACT

BACKGROUND: Asthma still poses a substantial and unacceptable health and economic burden. The National Asthma Education and Prevention Program (NAEPP) guidelines for the management of asthma continue to evolve based on emerging clinical data, improving the understanding of asthma and approaches to its management.

OBJECTIVE: To examine the clinical implications of current NAEPP guidelines for the diagnosis and treatment of asthma and the potential impact of the proposed 2007 guidelines update on asthma management. To examine the role of managed care organizations in fostering evidence-based asthma management.

SUMMARY: Current NAEPP guidelines recognize symptom control as the chief therapeutic target in the management of asthma. The proposed update to NAEPP guidelines places greater emphasis on symptom control by expanding its definition to not only include measures of impairment but also the risk for deteriorating pulmonary function, asthma exacerbations, and controller medication side effects. Although inhaled corticosteroids remain central to achieving long-term asthma control in both current and proposed guidelines, the latter offers greater treatment flexibility and recognizes combination therapy as a preferred choice for achieving control in many patients with moderate persistent asthma. Managed care organizations, primarily using disease management programs, provide impetus for the widespread adoption of evidence-based asthma treatment guidelines.

CONCLUSION: Widespread adoption of evidence-based asthma management programs offers the opportunity for achieving and maintaining asthma control.

KEYWORDS: Asthma, Managed care, Guidelines, Asthma control, Management

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Uncontrolled asthma continues to pose a substantial health care and financial burden. In the United States, asthma prevalence, hospitalizations, and mortality increased for more than 2 decades, before plateauing or slightly declining in 2000.[1] From 1979 to 1999, the asthma-associated death rates per 100,000 people almost doubled from 0.9 to 1.7, before declining slightly to 1.5 in 2002. The most recent estimates revealed that, in the United States, almost 20 million people were diagnosed with asthma in 2003, including approximately 6.2 million children under the age of 18 years.[1] Asthma prevalence spikes in children between the ages of 5 and 17 years, increasing during adulthood in females (50% higher than males), and in blacks (28% higher than whites). Uncontrolled asthma still engenders nearly 500,000 hospitalizations and more than 4,000 deaths annually.[1] Disconcertingly, almost 40% of the asthma-related hospitalizations occur in children under the age of 15 years. In addition, the direct and indirect costs associated with asthma treatment now total about $16 billion annually, with the costs associated with uncontrolled asthma about twice that for controlled asthma.[1,2]

Because uncontrolled asthma continues to be a prevalent and sometimes debilitating and potentially life-threatening disorder, optimal asthma management aimed at maintaining consistent control remains a paramount treatment goal. The National Asthma Education and Prevention Program (NAEPP) asthma guidelines focus on symptom control as a central feature of optimal management; the implementation of the most recent guidelines (2002) and the proposed 2007 updates, when finalized, will offer managed health care organizations an opportunity to optimize the treatment of asthma for their enrollees.

In April 2007, a symposium was held in San Diego, California, to examine the implications of current and proposed NAEPP asthma treatment guidelines for improving asthma outcomes. The symposium's expert participants provided valuable data and perspectives on the potential role of NAEPP proposed guidelines in asthma diagnosis and treatment as well as the role of managed care organizations in fostering their use among health care providers. The faculty included Robert P. Navarro, PharmD, president, NavarroPharma, LLC, cofounder of the Academy of Managed Care Pharmacy; Gary K. Rice, RPh, MS, MBA, vice president, Pharmaceutical Services, Kelsey-Seybold Clinic, Houston, Texas; and Kenneth L. Schaecher, MD, medical director, SelectHealth, Salt Lake City, Utah. This manuscript is based on the content of that symposium and includes current published clinical findings and expert opinions relevant to best practices in asthma management.

Guideline-Driven Asthma Management: Emphasis on Symptom Control

The NAEPP Expert Panel, organized by the National Institutes of Health's National Heart, Lung, and Blood Institute (NHLBI), was created in 1989 to improve asthma care in the United States.[3] The panel published asthma management guidelines initially in 1991 and again in 1997. The NAEPP panel updates their guidelines on a periodic basis, focusing on key clinical questions. Their most recent update, published in 2002, focused on treatment, monitoring, and prevention issues. A draft 2007 update, focusing chiefly on diagnostic and treatment issues, had been posted at the NHLBI Web site for public comment; a final version is expected later in 2007. Because they are evidence-driven, these guidelines provide a valuable tool for improving asthma care.

Diagnostic Considerations

In the absence of a definitive test for asthma, diagnosis relies on the presence of a constellation of clinical symptoms, chiefly wheezing, dyspnea, and cough, as well as the patient's personal and family history, and the findings from pulmonary function testing.[3,4] NAEPP 2002 guidelines further recommend that before making the diagnosis of asthma, clinicians exclude other conditions that induce asthma-like symptoms, such as allergic rhinosinusitis, cystic fibrosis, chronic obstructive pulmonary disease, heart failure, pulmonary embolism, and viral bronchiolitis in children and angiotensin-converting enzyme inhibitor-related cough and vocal cord dysfunction in adults.[3] Episodic, asthma symptoms frequently occur at night or in the early morning, triggering sleep disruption. Individuals with suspected asthma may also report that their symptoms are sparked by viral upper respiratory infection; exposure to specific allergens, including pollens, molds, or pets; or non-allergic triggers, such as weather changes exercise or exposure to irritants such as smoke or smog.

Classification

NAEPP 2002 guidelines advocate the use of spirometry, not just peak expiratory flow (PEF) testing, for the initial assessment and ongoing evaluation of asthma. It should be noted, however, that individuals with asthma may display normal lung function during a given testing period.[3] Pulmonary function measurements and asthma symptoms largely determine the level of asthma severity, based on NAEPP guidelines (Table 1).

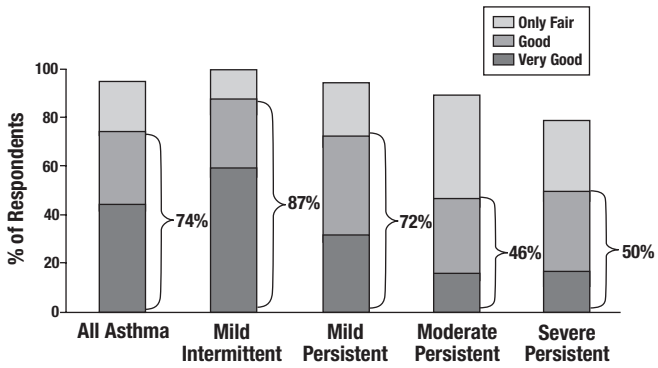
Several factors complicate the accurate assessment of asthma severity, including the assessment of symptoms before the start of treatment, substantial symptom variability, and the fact that patients and caregivers often underestimate asthma severity. For instance, for the children diagnosed with moderate asthma (daytime symptoms and/or nighttime symptoms more than once weekly) in the Children & Asthma in America survey, 46% of caregivers rated their children's asthma control as good or very good; for the children classified with severe asthma (continual daytime symptoms and frequent nighttime symptoms), 50% of caregivers described asthma control as good or very good (Figure 1).[5]

TABLE 1 Asthma Classification in Adults and Children*

Classification	Daytime Symptom Frequency	Nighttime Symptom Frequency	Lung Function
Mild intermittent	≤2 days/week	≤2 nights/month	PEF or FEV_1: ≥80% of predicted
Mild persistent	>2 days/week; <1x/day	>2 nights/month	PEF or FEV_1: ≥80% of predicted
Moderate persistent	Daily	>1 night/week	PEF or FEV_1: 60-80% of predicted
Severe persistent	Continual	Frequent	PEF or FEV_1: ≤60% of predicted

** Classification based on symptoms and lung function before treatment.*
Adapted from Mintz, 2004.[3]
FEV_1=forced expiratory volume in 1 second; PEF= peak expiratory flow.

FIGURE 1 Perceived Asthma Rating by Symptom Severity During Past 4 Weeks



Asthma in America Web site.[6]

Early Identification

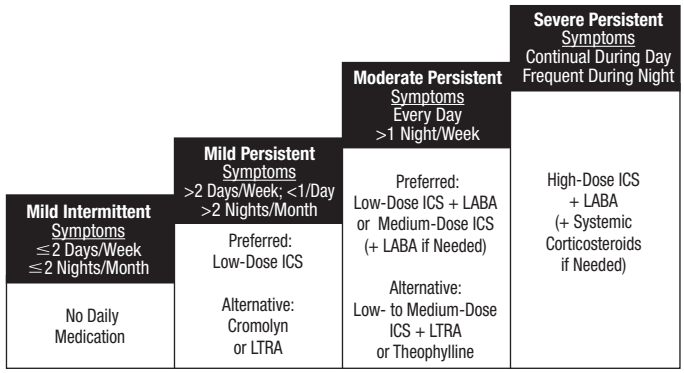
Since most cases of asthma begin during the first years of life, the identification of young children at high risk for developing asthma represents an important step in early disease management, providing an opportunity for altering the disease course. Investigators using data from the Tucson Children's Respiratory Study, a large, longitudinal assessment of respiratory illnesses in 1,246 children, starting at birth, developed 2 indices for the prediction of asthma.[7] The stringent index required children to exhibit frequent wheezing during the first 3 years of life and to meet at least 1 of 2 major criteria (parental history of asthma or eczema) or 2 or 3 minor

criteria (eosinophilia, wheezing without colds, or allergic rhinitis). The loose index required children to exhibit any wheezing during the first 3 years of life plus the same combination of other risk factors as those described for stringent index. Children with a positive stringent index were 4 to almost 10 times more likely to develop active asthma during their school years when compared with those with a negative index, and children with a positive loose index were about 3 to 5 times more likely to develop asthma than children with a negative index. In fact, 50% of the positive loose index and 76% of the positive stringent index children displayed evidence of active asthma during a subsequent school year. The investigators noted that the stringent index displayed a rather low sensitivity (14.8% to 27.5%), when compared with the loose index (39.3% to 56.6%), implying the looser index is sufficient to identify many at-risk children destined to develop asthma during their school years.

In addition, Guilbert and colleagues assessed the atopic profile of 285 toddler-aged children with recurrent wheezing who were at high risk for asthma because of a parental history of asthma or a personal history of atopic dermatitis, or both.[8] In this study, the majority (61%) of these children displayed sensitization to either food or aeroallergens, with eosinophilia and total serum IgE levels correlating strongly with aeroallergen sensitization. Male children were significantly more likely to display sensitization to aeroallergens and to manifest blood eosinophil levels of 4% or greater and total serum IgE levels of 100 IU/mL or greater. This highlights a potentially relevant role for aeroallergen sensitization in the early development of asthma, particularly in males. Overall, these findings suggest that relatively simple, readily available clinical data can be useful in predicting subsequent asthma development in children.

Managed care organizations should consider reimbursing for routine spirometry assessments in at-risk children and sponsor educational initiatives that would increase the recognition among primary care physicians and caregivers of the key signs and symptoms that signal an increased risk for asthma.

FIGURE 2 2002 NAEPP Expert Panel Guideline Steps in Asthma Therapy



Key point: *Guidelines support ICSs as the preferred first-line controller therapy. Cromolyn, LTRA, and theophylline are listed as alternative therapies*

These recommendations are for children 5 years or younger. For children older than 5 years, the guidelines are similar except that

1. *alternative therapies for mild persistent asthma also include nedocromil and sustained-release theophylline,*
2. *preferred therapy for moderate persistent asthma is to use low- to medium-dose ICS + LABA (increase to medium-dose ICS + LABA if needed), and*
3. *alternative therapy for moderate persistent asthma is to increase ICS with no LABA or use low- to medium-dose ICS + leukotriene modifier or theophylline.*

National Asthma Education and Prevention Program. Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma. Update on Selected Topics 2002. National Heart, Lung, and Blood Institute, National Institutes of Health; June 2003. NIH publication 02-5074.

ICS = inhaled corticosteroid; LABA = long-acting beta-agonist; LTRA = leukotriene-receptor antagonist.

Treatment Considerations

The 2002 NAEPP guidelines advocate a stepwise approach to therapy based on the level of asthma control, with maintenance therapy commencing when daytime symptom frequency exceeds twice weekly (Figure 2).[9] The guidelines support the addition of a long-acting beta$_2$-agonist for patients diagnosed with at least moderate persistent asthma.

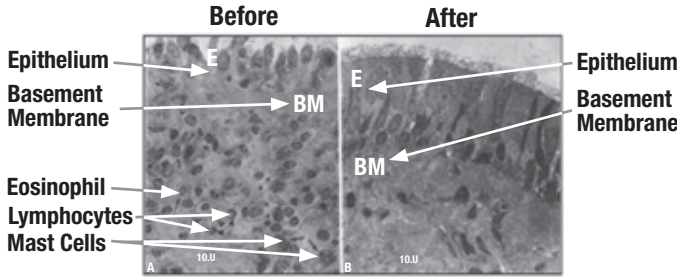
The NAEPP 2002 Expert Panel points out that clinical trial data strongly support the use of inhaled corticosteroids (ICSs) for improving asthma control in patients with mild or moderate persistent asthma.[9] When compared with as-needed beta$_2$-agonists, ICSs improve prebronchodilator forced expiratory volume in 1 second (FEV_1), dampen airway hyperresponsiveness, attenuate symptoms, and reduce the need for oral corticosteroids and asthma exacerbation-related hospitalizations.[9] Controversy remains, however, as to whether long-term ICS use slows disease progression in asthma?

Inhaled Corticosteroids and Asthma Progression

One of the potential pathophysiological changes in asthma—airway remodeling, characterized by smooth-muscle hypertrophy, basement-membrane thickening, epithelial cell destruction, and other deleterious alterations to the lung membrane architecture. This can occur even in patients with mild asthma.[3] Short-term (3 months) ICS therapy has been shown to increase the number of ciliated airway cells and intraepithelial nerves and reduce inflammatory cell infiltrates, restoring the lung membrane architecture disrupted in patients with untreated asthma (Figure 3).[10]

Findings such as these led to the hypothesis that a possible reversal of airway remodeling in asthma secondary to long-term ICS therapy would yield beneficial disease modifying effects. Yet, whether sufficient evidence exists to conclude that the early

FIGURE 3 Effects of Inhaled Corticosteriods (ICSs) on Inflammation



Before and After 3 Months of Treatment With an ICS (Budesonide)

Key point: Asthma, even when mild, is primarily a disease of extensive airway inflammation. Controller therapy with an ICS can improve the condition of inflamed airways.

The figure shown is an electron microscopic picture from a bronchial biopsy specimen obtained during a 12-week, randomized controlled trial in 14 adults with newly diagnosed asthma. Bronchial biopsy specimens, clinical symptoms, and lung function were evaluated in 7 patients receiving daily ICS therapy and 7 patients receiving a daily beta-agonist. In the figure, bronchial biopsy specimens from a patient with asthma for 9 months are shown before randomization and after 3 months of treatment with an ICS.

The picture on the left indicates a highly damaged airway epithelium (E) and evidence of an inflammatory reaction, including eosinophils (thick black arrows) and lymphocytes (arrow heads) beneath the basement membrane (BM). Mast cells (thin black arrows) are highly degranulated. The picture on the right shows a bronchial biopsy from the same patient after 3 months of treatment with an ICS.

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TABLE 2 Definition of Well-Controlled Asthma

- Asthma symptoms twice a week or less
- Rescue bronchodilator use twice a week or less
- No nighttime or early-morning awakening
- No limitations on exercise, work, or school
- Well-controlled asthma by patient and physician assessments
- Normal or personal best PEF or FEV_1

From Joint Task force, 2005[13]
FEV_1= forced expiratory volume in 1 second; PEF=peak expiratory flow.

treatment of asthma prevents or reverses disease progression remains controversial.

The Childhood Asthma Management Program (CAMP) trial, a randomized, prospective study of more than 1,000 children aged 5 to 12 years with mild-to-moderate asthma, examined the long-term (4 to 6 years) effects of the ICS budesonide (200 µg/daily), the mast-cell stabilizer nedocromil, and placebo.[11] All subjects were permitted to use as-needed bronchodilator therapy (albuterol). The results confirmed the role of ICS therapy as first-line therapy—budesonide improved airway responsiveness and provided better control of asthma symptoms than either nedocromil or placebo. However, the CAMP study did not provide evidence of disease-modifying effects with long-term ICS therapy—progressive declines in lung function did not emerge in any treatment group, and, with treatment discontinuation, airway hyperresponsiveness reemerged. These findings were buttressed by data from the Prevention of Early Asthma in Kids (PEAK) study, a randomized trial that included 285 young children aged 2 to 3 years at high risk for persistent asthma based on the presence of wheezing or allergy.[12] In this study, which assessed whether ICSs modify subsequent asthma development, children were randomized to treatment with either fluticasone propionate (88 µg twice daily) or placebo for 2 years. During the treatment period, ICS treatment yielded significant increases in episode-free days and lower exacerbation rates as well as significant reductions in the use of supplementary controller medication. Nonetheless, in these preschool children at high risk for asthma, a full 2 years of ICS therapy did not alter the development of asthma symptoms or alter lung function during a third, treatment-free year. These findings argue that although ICS therapy reduces asthma disease burden, it may not alter disease progression.

Focus Shifts to Asthma Symptom Control

Data demonstrating the failure of controller asthma therapy to alter long-term lung remodeling in asthma, principally from results of the CAMP trial, compelled the 2002 NAEPP expert panel to focus on symptom control and quality of life instead of long-term disease remission as reasonable and attainable treatment goals.

The NAEPP guidelines point out that asthma control can be expected to vary over time and should be assessed at every clinical encounter and that asthma management decisions should be based on the level of control.[13] Asthma control, defined in Table 2, is based on the frequency of asthma symptoms, the need for rescue asthma medication, patient and physician assessments, and lung function testing as well as quality-of-life issues, such as the presence of sleep disturbances and limitations to daily activities.

Measuring Asthma Control

Asthma control can be a complex, multidimensional parameter encompassing physiologic assessments and global assessments of functionality, daytime and nighttime symptoms, health care utilization, and adherence to therapy.[14] Yet, in an active clinical practice with limited time and resources, how can asthma control be efficiently assessed? Easy-to-use questionnaires to evaluate control may include the Asthma Therapy Assessment Questionnaire (ATAQ), the Asthma Control Questionnaire (ACQ) and the Asthma Control Test (ACT). The ACT, for instance, was developed as a patient-based tool to identify individuals with poorly controlled

FIGURE 4 *Asthma Control Test for Patients at Least 12 Years Old*

					Score
1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?					
All of the time ①	Most of the time ②	Some of the time ③	A little of the time ④	None of the time ⑤	
2. During the past 4 weeks, how often have you had shortness of breath?					
More than once a day ①	Once a day ②	3 to 6 times a week ③	Once or twice a week ④	Not at all ⑤	
3. During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness, or pain) wake you up at night or earlier than usual in the morning?					
4 or more nights a week ①	2 or 3 nights a week ②	Once a week ③	Once or twice ④	Not at all ⑤	
4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?					
3 or more times per day ①	1 or 2 times per day ②	2 or 3 times per week ③	Once a week or less ④	Not at all ⑤	
5. How would you rate your asthma control during the past 4 weeks?					
Not controlled at all ①	Poorly controlled ②	Somewhat controlled ③	Well controlled ④	Completely controlled ⑤	
A score of ≤19 means your patient's asthma may not be under control.				**Total**	

Asthma Control Test is a trademark of QualityMetric Incorporated. Copyright 2002.

asthma.[15] Versions of the ACT were developed for adults (Figure 4), children and caregiver (Figures 5A and 5B).

ACT scores have been shown to correlate with asthma-specialist ratings of asthma control and the percent-predicted FEV_1.[15] As a screening tool, ACT scores have demonstrated an overall agreement with specialist ratings ranging from 71% to 78%. These findings underscore the potential usefulness of the brief, easy-to-administer ACT as a tool for evaluating asthma control in the physician's office setting.

Achieving Asthma Control

Asthma control now represents the primary goal of treatment set by the 2002 NHLBI guidelines—that is, the prevention of chronic and troublesome symptoms during daytime and nighttime and the prevention recurrent exacerbations. Yet, the Children & Asthma in America survey data show that about 20% of children diagnosed with asthma still experience poor asthma control—wheezing, shortness of breath, chest tightness, and coughing at least three time a week.[5] The financial consequences of poor asthma control are substantial—more than 80% of the total asthma-related health costs are generated by the 20% of patients with the poorest asthma control.[16]

Asthma control remains an elusive goal for many patients and clinicians. This leads to the question of whether asthma control, as defined by current guidelines, is realistically achievable in practice. A large, one-year, randomized, double-blind study that included patients with asthma, recruited from general practice and hospital clinics, examined that issue.[17] The study, which included 3,400 patients at least 12 years of age, compared inhaled mono-therapy with fluticasone and combination therapy that included salmeterol and fluticasone in achieving rigorous, guideline-based measures of control. In this study, totally controlled asthma was defined as no daytime symptoms or rescue beta 2-agonist use, and morning PEF ≥80% of predicted each day. Well-controlled asthma was defined as daytime symptoms 2 or fewer days per week, the need for rescue beta 2-agonist medication on 2 or fewer days and 4 or fewer occasion per week, and a PEF ≥80% of predicted each day.[17] Both measures of control also required the absence of nighttime awakenings, asthma exacerbations, or emergency visits to the hospital. In the combination therapy group, total control was achieved by 31% of the patients compared with 19% of the patients in the monotherapy group. In addition, asthma was well controlled at the end of the study in 71% and 59% of the combination and monotherapy groups, respectively. These results imply that guideline-based persistent asthma control can be achieved for a majority of patients with asthma, especially with the use of combination therapy, although a significant proportion of patients still failed to reach guideline-defined control criteria.

Data showing that combination therapy can bolster asthma control led the NAEPP panel to revise the 2002 treatment recommendations for moderate persistent asthma to include long-acting inhaled beta 2-agonists along with low-to-medium dose ICS therapy for adults and children older than 5 years (Figure 2). Although combination therapies have not been well studied in children under the age of 5 years, the NAEPP 2002 expert panel suggests either monotherapy with medium-dose ICSs or the addition of long-acting inhaled beta 2-agonists to low-dose ICSs, when needed, as prudent treatment options for moderate persistent asthma.

FIGURE 5A Asthma Control Test for Children

1. How is your asthma today?				Score
 0 Very Bad	 1 Bad	 2 Good	 3 Very Good	☐
2. How much of a problem is your asthma when you run, exercise, or play sports?				
 0 It's a big problem, I can't do what I want to do.	 1 It's a problem and I don't like it.	 2 It's a problem but it's okay.	 3 It's not a problem.	☐
3. Do you cough because of your asthma?				
 0 Yes, all of the time.	 1 Yes, most of the time.	 2 Yes, some of the time.	 3 No, none of the time.	☐
4. Do you wake up during the night because of your asthma?				
 0 Yes, all of the time.	 1 Yes, most of the time.	 2 Yes, some of the time.	 3 No, none of the time.	☐

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NAEPP Proposed 2007 Update

The draft asthma treatment guideline update proposed by the NAEPP Expert Panel III should be finalized in the second half of 2007. Based on a preliminary draft report posted for public comment on the NHLBI Web site, the proposed changes do not represent a marked departure from previous 2002 recommendations.[18] Key proposed recommendations from the 2007 draft of NAEPP guidelines are shown in Table 3.[19] Perhaps the most notable change is the further emphasis on asthma control as the predominant consideration in asthma management. The proposed guidelines link asthma control to two dimensions or domains: the burden of disease or impairment, which can be measured by number of tools including ACT; and risk, which includes not only the risk of asthma exacerbations but also the risk for accelerated decline in pulmonary function with the emergence of airflow obstruction, and the potential risk for side effects associated with long-term controller medication use.[18]

The 2007 update continues to emphasize anti-inflammatory agents as the most effective medications for long-term asthma therapy, but the guidelines also now note that that these agents do not appear to prevent disease progression. The proposed guidelines maintain the mild, moderate, and severe persistent asthma

FIGURE 5B Childhood Asthma Control Test: Questions Completed by Parent/Caregiver

						Score
5. During the last 4 weeks, how many days did your child have any daytime asthma symptoms?						
Not at all ⑤	1-3 days ④	4-10 days ③	11-18 days ②	19-24 days ①	Every day ⓪	
6. During the last 4 weeks, how many days did your child wheeze during the day because of asthma?						
Not at all ⑤	1-3 days ④	4-10 days ③	11-18 days ②	19-24 days ①	Every day ⓪	
7. During the last 4 weeks, how many days did your child wake up during the night because of asthma?						
Not at all ⑤	1-3 days ④	4-10 days ③	11-18 days ②	19-24 days ①	Every day ⓪	
A score of ≤19 means your patient's asthma might not be controlled as well as it could be.					**Total**	

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TABLE 3 Key Proposed Recommendations of Expert Panel III Asthma Guidelines[19]

- Assessment of asthma control includes 2 domains: impairment and risk; focuses on risk and impairment as important factors in improving long-term outcome.
- Recognizes the potential for an increased risk for asthma exacerbation in patients taking long-acting beta-agonists
- Notes that current anti-inflammatory therapy does not prevent disease progression
- Changes the severity classification for chronic asthma: mild intermittent change to intermittent in order to emphasize that even patients with intermittent asthma can have severe exacerbations
- Recommendations for managing asthma separated by age groups: ≤4years, 5 to 11 years, and ≥12 years
- Introduces new paradigm for pulmonary function test measures: FEV_1/FVC added to classify severity in children

FEV_1/FVC=forced expiratory volume in 1 second/forced vital capacity.

categories but abolish the mild asthma category, replacing it with intermittent asthma to emphasize the point that even patients with milder forms of asthma can have severe exacerbations. In addition, instead of the 2 age categories used in the previous guidelines (≤5 years and >5 years), the updated guidelines advocate 3 sets of recommendations for managing asthma, based on age: ≤4 years, 5 to 11 years, and ≥12 years. This change was driven by the growing knowledge that the nature of asthma and the appropriateness of certain asthma treatments and assessments, such as lung function testing, change over the patient's lifetime. The proposed draft also introduced a new paradigm for pulmonary function testing in children: the addition of FEV_1/FVC (forced vital capacity) to classify severity.[19]

The proposed guideline revisions also emphasize the need to consider the effects of asthma on quality of life and functional capacity separately, on an ongoing basis, as these domains may respond differently to treatment. Moreover, they place greater emphasis on 2 aspects of the asthma treatment plan: daily management and the early recognition of asthma exacerbations.

Moreover, the proposed guidelines increase the number of treatment steps from 4 to 6, supporting greater treatment flexibility. In the proposed treatment paradigm, treatment with a short-acting beta 2-agonist to achieve symptom control commences on an as-needed basis at the initial diagnosis of intermittent asthma, with an emphasis on patient education and trigger avoidance at all treatment steps. The guidelines also advocate daily therapy for persistent asthma, and combination therapy, preferably with a LABA, when control cannot be achieved with ICSs alone. It should be noted, however, that the new guidelines discuss the potential for an elevated risk for asthma-related mortality with LABA therapy and that this risk should be weighted against the benefits achieved by their use in patients incompletely controlled by low-to-medium doses of ICSs. In fact, LABA product labeling contains a boxed warning that indicates these agents should be prescribed only in patients not adequately controlled by low-to-medium doses of ICSs or whose disease severity clearly warrants initiation of treatment with 2 maintenance therapies.[20] A variety of agents are offered for consideration as alternative therapies, including cromolyn, leukotriene-receptor antagonists, and, in patients with uncontrolled, moderate-to-severe IgE-mediated disease, omalizumab.

Asthma Control: Managed Care Initiatives

According to the NAEPP, asthma care in the United States still falls well short of the goals established by guidelines.[5] Indeed, studies of children and adults who require emergency treatment for asthma exacerbations reveal that less than half received anti-inflammatory therapy, and only about 28% of adults had written asthma action plans for controlling asthma.

Driven largely by the clear need to improve asthma management, employers and patients have spurred managed care organizations to develop management programs. Managed care organ-

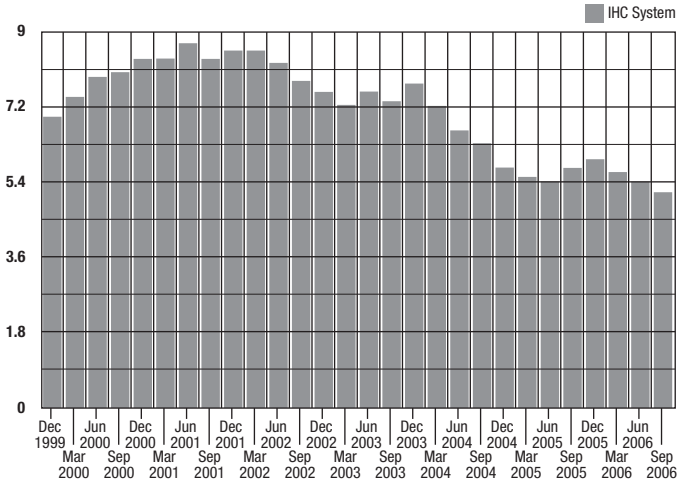
izations typically develop these programs based on the treatment principles established in the NAEPP guidelines published in 1997 and updated in 2002. For instance, SelectHealth, an Intermountain Healthcare Company located in Salt Lake City, Utah, provides an array of services to optimize asthma management. For health care providers, it supplies educational materials that focus on the process of asthma care by using guideline-based algorithms for diagnosis and treatment. In addition, SelectHealth routinely provides clinicians with asthma outcome measurement tools, such as ACT. In fact, this managed care organization emphasizes the importance of outcome measurement based on their axiom, "what you don't measure, you can't manage." For patients, SelectHealth also provides educational materials such as newsletters, educational brochures, and notices of community asthma outreach events as well as monitoring tools, such as peak flow meters. When used properly, peak flow monitoring provides objective information on disease status, even in the absence of overt symptoms, and reveals ongoing pulmonary dysfunction to the patient. This information may promote continued adherence to the asthma treatment plan.

The SelectHealth asthma management program follows the 2002 NAEPP diagnosis and treatment guidelines and includes disease managers that focus solely on asthma treatment. Disease managers receive plan member health care utilization data, such as pharmacy data related to the level of controller use, and emergency room or inpatient utilization information. These data permit the identification of members at high risk for asthma exacerbations. Once these at-risk patients are identified, case managers work with clinicians to regain symptom control. SelectHealth has also developed an asthma workgroup that examines what changes should be made to their established asthma treatment guidelines to ensure consistency with current national guidelines. In addition, on a yearly basis, SelectHealth provides continuing medical education opportunities to physicians in their organizations, so that these professionals can maintain a "state of the art" approach to asthma management. These so-called "Clinical Learning Days" provide SelectHealth with an opportunity to remind clinicians about the current asthma care process models and to introduce any new processes that may have been implemented within the past year.

Since the implementation of SelectHealth's asthma disease management program, there has been a notable decline in asthma-related emergency room visits (Figure 6). Moreover, since implementation (December 1999), beta 2-agonist use has also declined, with the percentage of patients with 3 or more short-acting beta 2-agonist prescriptions filled decreasing from 12% (December 1999) to about 5% (September 2006). Controller use, 80% at the start of the program, gradually increased and has plateaued at 90%. These results demonstrate that asthma disease management programs utilized by managed care organizations can foster improvements in asthma control, although the gains made so far still fall short of optimal management.

At the Kelsey-Seybold Clinic, an integrated health care system that includes more than 300 physicians providing primary and specialty care to more than 300,000 patients at 18 or more clinic locations throughout Houston, Texas, the pharmaceutical services department, working in conjunction with physicians and their nursing staffs, plays a pivotal role in managing asthma with their 12 pharmacies located within the clinics. Kelsey-Seybold emphasizes 4 key components of asthma management: objective assessment and monitoring; control of factors contributing to asthma severity, such as environmental triggers; pharmacologic therapy with a focus on the use of controller medications versus rescue medications; and patient and caregiver education.

FIGURE 6 Percentage of Patients With Emergency Room Visits for Asthma Exacerbation Since Implementation of Disease Management Program



IHC = Intermountain Healthcare.

Once finalized, the 2007 changes to the NAEPP guidelines will likely be adopted quickly by managed care organizations nationwide. This will result in a more aggressive focus on consistent asthma control through the use of educational initiatives to foster early asthma recognition, an increased used of spirometry to diagnose and classify asthma, and a more aggressive treatment approach that would encompass short-acting beta-agonist treatment, on an as-needed basis, even in mild, intermittent asthma, and combination therapy to gain and retain control of more severe asthma. Managed care will also likely promote the use of patient self-management and self-assessment programs to bolster patient adherence rates and to more readily identify those patients who experience exacerbations or other signs of uncontrolled asthma between regular physician visits.

Conclusions

The alarming increase in asthma prevalence worldwide in recent

decades has sparked the development and evolution of evidence-based guidelines aimed at reducing the substantial health and economic burden imposed by this disorder. Yet, the treatment of asthma remains a significant therapeutic challenge and, for many patients, long-term asthma control remains suboptimal. In the United States, the NAEPP guidelines form the foundation for asthma disease management programs offered by most managed health care organizations and, thus, have a direct impact on widely adopted asthma care strategies. In recent years, emerging evidence has not only changed the face of asthma but also identified therapeutic options that constitute optimal care.

Asthma is now viewed as a persistent lifelong disorder, often punctuated by unpredictable exacerbations. This view has led to a reappraisal of the primary treatment goals in asthma management, with the focus shifting away from severity to asthma control, defined by reduced and stabilized symptom frequency and rescue medication use as well as normal pulmonary function assessments. However, the proposed 2007 NAEPP guidelines set an even higher bar for achieving symptom control by including not just disease burden but also the risks for exacerbations, pulmonary function decline, and the long-term side effects associated with treatment. Finalization and adoption of the proposed updates to the NAEPP guidelines, with an increased emphasis on consistent asthma control, offers a sound opportunity for improving the quality of asthma care and ultimate quality of life of patients.

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Asthma Management Guidelines: Updates, Advances, and New Options

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Posttest Worksheet: Asthma Management Guidelines: Updates, Advances, and New Options

1. Based on the most recent estimates, asthma has been diagnosed in how many Americans?
   a. 5 million
   b. 10 million
   c. 20 million
   d. 30 million

2. Clinical data show that a majority of toddler-age children with recurrent wheezing display sensitization to food or aeroallergens.
   a. True
   b. False

3. Based on the NAEPP 2002 guidelines, which of the following is a characteristic of moderate persistent asthma?
   a. Nighttime symptoms once weekly
   b. Daytime symptoms 2 days per week
   c. Continual daytime symptoms
   d. Daily daytime symptoms

4. Based on the 2002 NAEPP guidelines, which is the most appropriate medication for mild intermittent asthma?
   a. Low-dose inhaled corticosteroids
   b. Leukotriene-receptor antagonists
   c. Long-acting beta-agonists
   d. None

5. Which of the following is the main treatment goal in asthma management?
   a. Improved pulmonary function
   b. Reduction in asthma severity
   c. Symptom control
   d. Maintenance of low-dose inhaled corticosteroid therapy

6. In the proposed 2007 update to the NAEPP guidelines, asthma control includes which 2 domains?
   a. Impairment and risk
   b. Severity and risk
   c. Impairment and disease progression
   d. Severity and disease progression

7. The proposed NAEPP guidelines discuss an increased risk for asthma-related mortality in association with which of the following treatment options?
   a. ICS
   b. Long-acting beta-agonists
   c. Leukotriene-receptor antagonists
   d. Theophylline

8. To achieve asthma control in patients not controlled on ICS therapy alone, the proposed NAEPP guidelines recognized an important role for which therapy option?
   a. Omalizumab
   b. Combined inhaled corticosteroid/long acting beta-agonist therapy
   c. Cromolyn
   d. Theophyllinet

9. The proposed NAEPP guidelines discuss an increased risk for asthma-related mortality in association with which of the following treatment options?
   a. ICS
   b. Long-acting beta-agonists
   c. Leukotriene-receptor antagonists
   d. Theophylline

10. Managed care organizations typically promote the evidence-based treatment of asthma through the use of which strategy?
    a. Financial incentives to physicians
    b. Lower copays for appropriate medication utilization
    c. Comprehensive disease management programs
    d. The use of closed formularies for asthma medications

To complete this activity, go to www.amcp.org (Learning Center/Online CE), where you will access the posttest and evaluation form.

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