Complete Summary

GUIDELINE TITLE

Managing asthma long term in children 0-4 years of age and 5-11 years of age: Expert panel report 3: guidelines for the diagnosis and management of asthma.

BIBLIOGRAPHIC SOURCE(S)

Managing asthma long term in children 0-4 years of age and 5-11 years of age. In: National Asthma Education and Prevention Program (NAEPP). Expert panel report 3: guidelines for the diagnosis and management of asthma. Bethesda (MD): National Heart, Lung, and Blood Institute; 2007 Aug. p. 281-325. [84 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: National Asthma Education and Prevention Program Expert Panel Report: guidelines for the diagnosis and management of asthma update on selected topics-2002. J Allergy Clin Immunol 2002 Nov;110(5 pt 2):S141-219.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Asthma

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Risk Assessment
Treatment

CLINICAL SPECIALTY

Allergy and Immunology
Emergency Medicine
Family Practice
Internal Medicine
Pediatrics
Preventive Medicine
Pulmonary Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Plans
Nurses
Physician Assistants
Physicians
Respiratory Care Practitioners

GUIDELINE OBJECTIVE(S)

- To present recommendations for the diagnosis and management of asthma that will help clinicians and patients make appropriate decisions about asthma care
- To develop clinical practice tools and educational materials for patients and the public
- To revise the National Asthma Education and Prevention Program Expert Panel Report-2 Stepwise Approach for Managing Asthma in order to incorporate findings from the review of the scientific evidence
- To present recommendations on the long-term management of asthma in children aged 0 to 4 years and 5 to 11 years

TARGET POPULATION

Infants, and children 0 to 4 years and 5 to 11 years of age with asthma

INTERVENTIONS AND PRACTICES CONSIDERED

Long-term Management

1. Stepwise approach to pharmacologic therapy
2. Pharmacologic options
    - Long-term control medications
        - Corticosteroids (inhaled or systemic)

        - Cromolyn sodium and nedocromil
        - Immunomodulators
        - Leukotriene receptor antagonists
        - Long-acting beta$_2$-agonist(s)
        - Methylxanthines
    - Quick-relief medications
        - Anticholinergics
        - Short-acting beta$_2$-agonist(s)
        - Systemic corticosteroids
3. Monitoring and follow-up
4. Patient education
5. Written asthma action plan
6. Referral to specialist

MAJOR OUTCOMES CONSIDERED

- Lung function measurements
    - Forced expiratory volume in one second (FEV_1)
    - Peak expiratory flow (PEF)
- Symptom control as indicated by:
    - Symptom scores
    - Symptom frequency
    - Use of acute bronchodilator medication
    - Exacerbations
    - Use of oral corticosteroids

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

In October 2004, the Expert Panel assembled for its first meeting. Using the Expert Panel Report (EPR)—2 1997 and EPR—Update 2002 as the framework, the Expert Panel organized the literature searches and subsequent report around the four essential components of asthma care, namely: (1) assessment and monitoring, (2) patient education, (3) control of factors contributing to asthma severity, and (4) pharmacologic treatment. Subtopics were developed for each of these four broad categories.

Inclusion/Exclusion Criteria

The literature review was conducted in three cycles over an 18-month period (September 2004 to March 2006). Search strategies for the literature review initially were designed to cast a wide net but later were refined by using publication type limits and additional terms to produce results that more closely matched the framework of topics and subtopics selected by the Expert Panel. The searches included human studies with abstracts that were published in English in

peer-reviewed medical journals in the MEDLINE database. Two timeframes were used for the searches, dependent on topic: January 1, 2001, through March 15, 2006, for pharmacotherapy (medications), peak flow monitoring, and written action plans, because these topics were recently reviewed in the EPR—Update 2002; and January 1, 1997, through March 15, 2006, for all other topics, because these topics were last reviewed in the EPR—2 1997.

Search Strategies

Panel members identified, with input from a librarian, key text words for each of the four components of care. A separate search strategy was developed for each of the four components and various key subtopics when deemed appropriate. The key text words and Medical Subject Headings (MeSH) terms that were used to develop each search string are found in an appendix posted on the National Heart, Lung, and Blood Institute (NHLBI) Web site.

Literature Review Process

The systematic review covered a wide range of topics. Although the overarching framework for the review was based on the four essential components of asthma care, multiple subtopics were associated with each component. To organize a review of such an expanse, the Panel was divided into 10 committees, with about 4 to 7 reviewers in each (all reviewers were assigned to 2 or more committees). Within each committee, teams of two ("topic teams") were assigned as leads to cover specific topics. A system of independent review and vote by each of the two team reviewers was used at each step of the literature review process to identify studies to include in the guidelines update. The initial step in the literature review process was to screen titles from the searches for relevancy in updating content of the guidelines, followed by reviews of abstracts of the relevant titles to identify those studies meriting full-text review based on relevance to the guidelines and study quality.

The combined number of titles screened from cycles 1, 2, and 3 was 15,444. The number of abstracts and articles reviewed for all three cycles was 4,747. Of these, 2,863 were voted to the abstract Keep list following the abstract-review step. A database of these abstracts is posted on the NHLBI Web site. Of these abstracts, 2,122 were advanced for full-text review, which resulted in 1,654 articles serving as a bibliography of references used to update the guidelines, available on the NHLBI Web site. Articles were selected from this bibliography for evidence tables and/or citation in the text. In addition, articles reporting new and particularly relevant findings and published after March 2006 were identified by Panel members during the writing period (March 2006–December 2006) and by comments received from the public review in February 2007.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

The system* used to describe the level of evidence is as follows:

Evidence Category A: Randomized controlled trials (RCTs), rich body of data.
Evidence is from end points of well-designed RCTs that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of participants.

Evidence Category B: RCTs, limited body of data.
Evidence is from end points of intervention studies that include only a limited number of patients, post hoc or subgroup analysis of RCTs, or meta-analysis of RCTs. In general, category B pertains when few randomized trials exist; they are small in size, they were undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.

Evidence Category C: Nonrandomized trials and observational studies.
Evidence is from outcomes of uncontrolled or nonrandomized trials or from observational studies.

Evidence Category D: Panel consensus judgment.
This category is used only in cases where the provision of some guidance was deemed valuable, but the clinical literature addressing the subject was insufficient to justify placement in one of the other categories. The Panel consensus is based on clinical experience or knowledge that does not meet the criteria for categories A through C.

*Source: Jadad AR, Moher M, Browman GP, Booker L, Sigouin C, Fuentes M, Stevens R. Systematic reviews and meta-analyses on treatment of asthma: critical evaluation. *BMJ* 2000;320(7234):537-40.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Preparation of Evidence Tables

Evidence tables were prepared for selected topics. It was not feasible to generate evidence tables for every topic in the guidelines. Furthermore, many topics did not have a sufficient body of evidence or a sufficient number of high-quality studies to warrant the preparation of a table. The Panel decided to prepare evidence tables on those topics for which an evidence table would be particularly useful to assess the weight of the evidence—e.g., topics with numerous articles, conflicting evidence, or which addressed questions raised frequently by clinicians. Summary

findings on topics without evidence tables, however, also are included in the updated guidelines text. Evidence tables were prepared with the assistance of a methodologist who served as a consultant to the Expert Panel. Within their respective committees, Expert Panel members selected the topics and articles for evidence tables. The evidence tables included all articles that received a "yes" vote from both the primary and secondary reviewer during the systematic literature review process. The methodologist abstracted the articles to the tables, using a template developed by the Expert Panel. The Expert Panel subsequently reviewed and approved the final evidence tables. A total of 20 tables, comprising 316 articles are included in the current update. Evidence tables are posted on the National Heart, Lung, and Blood Institute (NHLBI) Web site.

Ranking the Evidence

The Expert Panel agreed to specify the level of evidence used to justify the recommendations being made. Panel members only included ranking of evidence for recommendations they made based on the scientific literature in the current evidence review. They did not assign evidence rankings to recommendations pulled through from the Expert Panel Report (EPR)—2 1997 on topics that are still important to the diagnosis and management of asthma but for which there was little new published literature. These "pull through" recommendations are designated by EPR—2 1997 in parentheses following the first mention of the recommendation. For recommendations that have been either revised or further substantiated on the basis of the evidence review conducted for the EPR—3: Full Report 2007, the level of evidence is indicated in the text in parentheses following first mention of the recommendation. Refer to the "Rating Scheme for the Strength of the Evidence" for the system used to describe the level of evidence.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The steps used to develop this report include: (1) completing a comprehensive search of the literature; (2) conducting an in-depth review of relevant abstracts and articles; (3) preparing evidence tables to assess the weight of current evidence with respect to past recommendations and new and unresolved issues; (4) conducting thoughtful discussion and interpretation of findings; (5) ranking strength of evidence underlying the current recommendations that are made; (6) updating text, tables, figures, and references of the existing guidelines with new findings from the evidence review; (7) circulating a draft of the updated guidelines through several layers of external review, as well as posting it on the National Heart, Lung, and Blood Institute (NHLBI) Web site for review and comment by the public and the National Asthma Education and Prevention Program Coordinating Committee (NAEPP CC), and (8) preparing a final-report based on consideration of comments raised in the review cycle.

Panel Discussion

The first opportunity for discussion of findings occurred within the "topic teams." Teams then presented a summary of their findings during a conference call to all members of their respective committee. A full discussion ensued on each topic, and the committee arrived at a consensus position. Teams then presented their findings and the committee position to the full Expert Panel at an in-person meeting, thereby engaging all Panel members in critical analysis of the evidence and interpretation of the data. A series of conference calls for each of the 10 committees as well as four in-person Expert Panel meetings (held in October 2004, April 2005, December 2005, and May 2006) were scheduled to facilitate discussion of findings and to dovetail with the three cycles of literature review that occurred over the 18-month period. Potential conflicts of interest were disclosed at the initial meeting.

Report Preparation

Development of the Expert Panel Report (EPR)—3: Full Report 2007 was an iterative process of interpreting the evidence, drafting summary statements, and reviewing comments from the various external reviews before completing the final report. In the summer and fall of 2005, the various topic teams, through conference calls and subsequent electronic mail, began drafting their assigned sections of the report. Members of the respective committees reviewed and revised team drafts, also by using conference calls and electronic mail. During the calls, votes were taken to ensure agreement with final conclusions and recommendations.

During the December 2005 meeting, Panel members reviewed and discussed all committee drafts. During the May 2006 meeting, the Panel conducted a thorough review and discussion of the report and reached consensus on the recommendations. For controversial topics, votes were taken to ensure that each individual's opinion was considered.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

In addition to specifying the level of evidence supporting a recommendation, the Expert Panel agreed to indicate the strength of the recommendation. When a certain clinical practice "is recommended," this indicates a strong recommendation by the panel. When a certain clinical practice "should, or may, be considered," this indicates that the recommendation is less strong.

This distinction is an effort to address nuances of using evidence ranking systems. For example, a recommendation for which clinical randomized controlled trial data are not available (e.g., conducting a medical history for symptoms suggestive of asthma) may still be strongly supported by the Panel. Furthermore, the range of evidence that qualifies a definition of "B" or "C" is wide, and the Expert Panel considered this range and the potential implications of a recommendation as they decided how strongly the recommendation should be presented.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

In July, using conference calls and electronic mail, the Panel completed a draft of the Expert Panel Report (EPR)—3: Full Report 2007 for submission in July/August to a panel of expert consultants for their review and comments. In response to their comments, a revised draft of the EPR—3: Full Report 2007 was developed and circulated in November to the National Asthma Education and Prevention Program (NAEPP) Guidelines Implementation Panel (GIP) for their comment. This draft was also posted on the National Heart Lung and Blood Institute (NHLBI) Web site for public comment in February 2007. The Expert Panel considered 721 comments from 140 reviewers. Edits were made to the documents, as appropriate, before the full EPR—3: Full Report 2007 was finalized and published.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions of the levels of the evidence (A, B, C, D) and strength of recommendations ("is recommended" and "should or may, be considered") are presented at the end of the "Major Recommendations" field.

Note from the National Asthma Education and Prevention Program (NAEPP): Panel members only included ranking of evidence for recommendations they made based on the scientific literature in the current evidence review. They did not assign evidence rankings to recommendations pulled through from the Expert Panel Report (EPR)—2 1997 on topics that are still important to the diagnosis and management of asthma but for which there was little new published literature. These "pull through" recommendations are designated by EPR—2 1997 in parentheses following the first mention of the recommendation.

Note from the NAEPP and the National Guideline Clearinghouse (NGC): The Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma have been divided into individual summaries covering assessment, education, medications, and management. In addition to the current summary, the following are available:

- Measures of asthma assessment and monitoring.
- Education for a partnership in asthma care.
- Control of environmental factors and comorbid conditions that affect asthma.
- Medications.
- Managing asthma long term in youths >12 years of age and adults.
- Managing asthma long term—special situations
- Managing exacerbations of asthma.

Key Points: Managing Asthma Long Term in Children 0-4 Years of Age and 5 – 11 Years of Age

- The goal for therapy is to control asthma by **(Evidence A)**:
    - Reducing impairment
        - Prevent chronic and troublesome symptoms (e.g., coughing or breathlessness in the daytime, in the night, or after exertion)
        - Require infrequent use ($\leq$2 days a week) of inhaled short-acting beta$_2$-agonist (SABA) for quick relief of symptoms (not including prevention of exercise-induced bronchospasm [EIB])
        - Maintain (near) normal pulmonary function
        - Maintain normal activity levels (including exercise and other physical activity and attendance at work or school)
        - Meet patients' and families' expectations of and satisfaction with asthma care
    - Reducing risk
        - Prevent recurrent exacerbations of asthma and minimize the need for emergency department (ED) visits or hospitalizations
        - Prevent progressive loss of lung function; for children, prevent reduced lung growth
        - Provide optimal pharmacotherapy with minimal or no adverse effects
- A stepwise approach to pharmacologic therapy is recommended to gain and maintain control of asthma in both the impairment and risk domains **(Evidence A)**:
    - The type, amount, and scheduling of medication is dictated by asthma *severity for initiating* therapy and the level of asthma *control for adjusting* therapy **(Evidence A)**.
    - Step-down therapy is essential to identify the minimum medication necessary to maintain control **(Evidence D)**.
- Monitoring and follow up is essential **(Evidence B)**.
    - When initiating therapy, monitor at 2- to 6-week intervals to ensure that asthma control is achieved **(Evidence D)**.
    - Regular follow up contacts at 1- to 6-month intervals, depending on level of control, are recommended to ensure that control is maintained and the appropriate adjustments in therapy are made: step up if necessary or step down if possible. Consider 3-month intervals if a step down in therapy is anticipated **(Evidence D)**.
- Because asthma is a chronic inflammatory disorder of the airway, persistent asthma is most effectively controlled with daily long-term control medication directed toward suppression of airway inflammation **(Evidence A)**.
- Therapeutic strategies should be considered in concert with clinician-patient partnership strategies; education of patients is essential for achieving optimal pharmacologic therapy **(Evidence A)**.
- At each step, patients should be advised to avoid or control allergens **(Evidence A)**, irritants, or comorbid conditions that make the patient's asthma worse **(Evidence B)**.
- A written asthma action plan detailing for the individual patient the daily management (medications and environmental control strategies) and how to recognize and handle worsening asthma is recommended for all patients; it is particularly recommended for patients who have moderate or severe asthma, a history of severe exacerbations, or poorly controlled asthma **(Evidence B)**. The written asthma action plan can be either symptom or peak-flow based; evidence shows similar benefits for each **(Evidence B)**.
- Referral to an asthma specialist for consultation or co management of the patient is recommended if there are difficulties achieving or maintaining

control of asthma; if additional education is needed to improve adherence; if the patient requires step 4 care or higher (step 3 care or higher for children 0 to 4 years of age); or if the patient has had an exacerbation requiring hospitalization. Consider referral if a patient requires step 3 care (step 2 care for children 0 to 4 years of age) or if additional testing for the role of allergy is indicated **(Evidence D)**

Key Differences from the 1997 and 2002 Expert Panel Reports

- Recommendations for managing asthma in children 0 to 4 and 5 to 11 years of age are presented separately from recommendations for managing asthma in youths ≥12 years of age and adults.
- Treatment decisions for *initiating* long-term control therapy are based on classifying severity (considering both the impairment and risk domains) and selecting a corresponding step for treatment. Recommendations on when to initiate therapy in children 0 to 4 years of age have been revised.
- Treatment decisions for *adjusting* therapy and maintaining control are based on assessing the level of asthma control (considering both the impairment and risk domains).
- The distinction between the domains of impairment and risk for assessing asthma control and guiding decisions for therapy emphasizes the need to consider separately asthma's effects on quality of life and functional capacity on an ongoing basis (i.e., in the present) and the risks it presents for adverse events in the future, such as exacerbations and progressive reduction in lung growth or lung function. These domains of asthma may respond differentially to treatment.
- Stepwise approach to managing asthma has been expanded to include six steps of care to simplify the actions within each step. For example, previous guidelines had several progressive actions within step 3, whereas the current guidelines separate the actions into different steps.
- Treatment options within the steps have been revised, especially:
    - For patients not well controlled on low-dose inhaled corticosteroid (ICS), increasing the dose of ICSs to medium dose is recommended before adding adjunctive therapy in the 0 to 4 years age group; for other age groups (children 5 to 11 years of age and youths ≥12 years of age and adults), increasing the dose of ICS to medium dose or adding adjunctive therapy to a low dose of ICS are considered as equal options.
    - Evidence for the selection of adjunctive therapy is limited in children under 12 years of age; recommendations vary according to the assessment of impairment or risk.
    - Steps 5–6 for youths ≥12 years of age and adults include consideration of omalizumab.
- Managing special situations has been expanded to include racial and ethnic disparities.

Diagnosis and Prognosis of Asthma in Children

Diagnosis of Asthma

0 to 4 Years of Age: The Expert Panel recommends that essential elements in the evaluation include the history, symptoms, physical examination, and assessment

of quality of life, as discussed in the NGC summary of the NAEPP guideline, Measures of Asthma Assessment and Monitoring. A therapeutic trial with medications listed in figure 4–1a in the original guideline document will also aid in the diagnosis.

5 to 11 Years of Age: The Expert Panel recommends that the diagnosis in children 5 years of age and older should follow the same procedures recommended in the NGC summary of the NAEPP guideline, Measures of Asthma Assessment and Monitoring.

Prevention of Asthma Progression

The Expert Panel concludes that evidence to date does not support the previously hypothesized contention that early intervention with an ICS, either continuously ("Long-term effects," 2000; Guilbert et al., 2006) or intermittently (Bisgaard & Szefler, 2006), may alter the underlying severity or progression of the disease. ICSs should be used to control asthma symptoms and to improve the child's quality of life, but their use should not be initiated or prolonged for the purpose of changing the natural history of the disease (i.e., the underlying severity or progression of asthma) **(Evidence A)**.

Monitoring Asthma Progression

The Expert Panel recommends that the following measures be monitored over the course of children's followup visits, especially in those children who have moderate or severe persistent asthma (require Step 3 care or higher), to assess both impairment and risk domains for the development of progressive disease: course of medications, including increasing use of SABAs and escalation of long-term control medications; episodes of severe exacerbations requiring systemic corticosteroids, urgent care visits, or hospitalizations; pulmonary function measures including prebronchodilator forced expiratory volume in 1 second/forced vital capacity (FEV_1/FVC) and FEV_1 (percent predicted) and postbronchodilator FEV_1 (percent predicted) **(Evidence B)**. If these measures so indicate, therapy should be stepped up to ensure adequate asthma control. See box 4–1 in the original guideline document for a sample patient record for monitoring asthma progression in children.

Treatment: Principles of Stepwise Therapy in Children

The Expert Panel recommends that the goal of asthma therapy is to maintain long-term control of asthma with the least amount of medication and hence minimal risk for adverse effects. Control of asthma may be viewed in the context of two domains—impairment and risk—and within these domains, defined as follows **(Evidence A)**.

- Reducing impairment
    - Prevent chronic and troublesome symptoms (e.g., coughing or breathlessness in the daytime, in the night, or after exertion)
    - Require infrequent use ($\leq$2 days a week) of SABA for quick relief of symptoms (not including prevention of EIB)
    - Maintain (near) normal pulmonary function

    - Maintain normal activity levels (including exercise and other physical activity and attendance at work or school)
    - Meet patients' and families' expectations of and satisfaction with asthma care
- Reducing risk
    - Prevent recurrent exacerbations of asthma and minimize the need for ED visits or hospitalizations
    - Prevent progressive loss of lung function; for children, prevent reduced lung growth
    - Provide optimal pharmacotherapy with minimal or no adverse effects

The Expert Panel recommends that the stepwise approach to therapy, in which the dose and number of medications and frequency of administration are increased as necessary (**Evidence B**, extrapolated from studies in older children and adults) and decreased when possible **(Evidence D)**, is used to achieve and maintain this control.

Achieving Control of Asthma

Selecting Initial Therapy

<u>0 to 4 Years of Age: Initiating Long-Term Control Therapy</u>

The Expert Panel concludes that initiating daily long-term control therapy:

- Is recommended for reducing impairment and risk of exacerbations in infants and young children who had four or more episodes of wheezing in the past year that lasted more than 1 day and affected sleep AND who have risk factors for developing persistent asthma: either (1) one of the following: parental history of asthma, a physician diagnosis of atopic dermatitis, or evidence of sensitization to aeroallergens OR (2) two of the following: evidence of sensitization to foods, $\geq$4 percent peripheral blood eosinophilia, or wheezing apart from colds **(Evidence A)**.
- Should be considered for reducing impairment in infants and young children who consistently require symptomatic treatment more than 2 days per week for a period of more than 4 weeks **(Evidence D)**.
- Should be considered for reducing risk in infants and young children who have a second asthma exacerbation requiring systemic corticosteroids within 6 months **(Evidence D)**.
- May be considered for use only during periods of previously documented risk for a child **(Evidence D)**. If daily long-term control therapy is discontinued after the season of increased risk, written asthma action plans indicating specific signs of worsening asthma and actions to take should be reviewed with the caregivers, and a clinic contact should be scheduled 2 to 6 weeks after discontinuation of therapy to ascertain whether adequate control is maintained satisfactorily **(Evidence D)**.

<u>5 to 11 Years of Age: Initiating Long-Term Control Therapy</u>

The Expert Panel recommends daily long-term control therapy for children who have persistent asthma **(Evidence A)**.

Adjusting Therapy

The Expert Panel recommends that, if a child is already taking long-term control medication, treatment decisions are based on the level of asthma control that has been achieved: therapy should be stepped up if necessary to achieve control (**Evidence B**—extrapolated from studies in youths and adults) (See figures 4–3a and 4–3b in the original guideline document).

- Address the *impairment* domain. Consider factors related to the different age groups.
    - ***0 to 4 years of age***: The level of impairment generally is judged on the most severe symptom. The risk domain is usually more strongly associated with asthma morbidity than the impairment domain, because children are often symptom free between exacerbations.
    - ***5 to 11 years of age***: The level of impairment generally is judged on the most severe measure among symptom report, asthma control score (using validated tools if available), and pulmonary function measures. For patients at step 3 or higher care, if office spirometry is feasible and suggests poorer control than does the assessment of impairment based on other measures, consider fixed airway obstruction as the explanation and reassess the other measures of impairment. If fixed airway obstruction does not appear to be the explanation, consider a step up in therapy, because low FEV_1 is a predictor of risk for exacerbations in children. (See the NGC summary of the NAEPP guideline, Measures of Asthma Assessment and Monitoring.)
    - The Expert Panel recommends the following actions if control of the impairment domain is not achieved and maintained at any step of care:
        - Patient adherence and technique in using medications correctly should be assessed and addressed as appropriate **(Evidence C)**. See the NGC summary of the NAEPP guideline, Education for a Partnership in Asthma Care, for discussion on assessing adherence.
        - Other factors that diminish control of asthma impairment should be addressed as possible reasons for poor response to therapy and targets for intervention **(Evidence C)**.
        - If patient adherence, inhaler technique, and environmental control measures are adequate, and asthma is not well controlled, a step up in treatment may be needed (**Evidence B**—extrapolated). For patients who have asthma that is not well controlled, in general step up one treatment step. For patients who have *very poor* asthma control, consider increasing treatment by two steps, a course of oral corticosteroids, or both **(Evidence D)**.
- Address the *risk* domain.
    - The Expert Panel recommends the following actions if control of the risk of exacerbations is not achieved or maintained **(Evidence D)**:
        - ***0 to 4 years of age***: If there is a history of one or more exacerbations, review adherence to medications and control of environmental exposures, review the patient's written asthma action plan to confirm that it includes oral prednisone for

patients who have histories of severe exacerbations, and consider stepping up therapy to the next level **(Evidence D)**.
    - ***5 to 11 years of age***: If the history of exacerbations suggests poorer control than does the assessment of impairment, the following actions are recommended: reassess the impairment domain, review adherence to medications and control of environmental exposures, review the patient's written asthma action plan to confirm that it includes oral prednisone for patients who have a history of severe exacerbations, and consider a step up in therapy, especially for children who have reduced lung function (Fuhlbrigge et al., 2001; 2006).
  - Address the *risk* domain with regard to side effects.

    The Expert Panel recommends consideration of alternative and/or adjunctive therapies within the step of care the patient is receiving if the patient experiences troublesome or debilitating side effects. In addition, confirm efforts to control environmental exposures **(Evidence D)**.

- Consider referral to an asthma specialist. The Expert Panel *recommends* referral to an asthma specialist for consultation or comanagement of the patient if **(Evidence D)**:
  - There are difficulties achieving or maintaining control of asthma.
  - A child 0 to 4 years of age requires step 3 care or higher (step 4 care or higher for children 5 to 11 years of age) to achieve and maintain control or if additional education is indicated to improve the patients' management skills or adherence. Referral may be *considered* if a child 0 to 4 years of age requires step 2 care or a child 5 to 11 years of age requires step 3 care.
  - The patient has had an exacerbation requiring hospitalization.
  - Immunotherapy or other immunomodulators are considered, or additional tests are indicated, to determine the role of allergy.

Maintaining Control of Asthma

The Expert Panel recommends that regular follow up contact is essential **(Evidence B)**. Contact at 1- to 6-month intervals is recommended, depending on the level of control; consider a 3-month interval if a step down in therapy is anticipated **(Evidence D)**.

The Expert Panel recommends that once well-controlled asthma is achieved and maintained for at least 3 months, a reduction in pharmacologic therapy—a step down—can be considered helpful to identify the minimum therapy for maintaining well-controlled asthma **(Evidence D)**. The opinion of the Expert Panel is that the dose of ICS may be reduced about 25 to 50 percent every 3 months to the lowest dose possible required to maintain control **(Evidence D)**.

Key Points: Inhaled Corticosteroids in Children

- ICSs are the preferred therapy for initiating long-term control therapy in children of all ages **(Evidence A)**.

- ICSs, especially at low doses and even for extended periods of time, are generally safe **(Evidence A)**.
- The potential for the adverse effect of low- to medium-dose ICS on linear growth is usually limited to a small reduction in growth velocity, approximately 1 cm in the first year of treatment, that is generally not progressive over time **(Evidence A)**. Children receiving ICS should be monitored, by using a stadiometer, for changes in growth **(Evidence D)**.
- The potential risks of ICSs are well balanced by their benefits.
- High doses of ICS administered for prolonged periods of time (for example, more than 1 year), particularly in combination with frequent courses of systemic corticosteroid therapy, may be associated with adverse growth effects and risk of posterior subcapsular cataracts or reduced bone density. Age-appropriate dietary intake of calcium and vitamin D should be reviewed with the child's caregivers **(Evidence D)**. Slit-lamp eye exam and bone densitometry should be considered **(Evidence D)**.
- See also the NGC summary of the NAEPP guideline, Medications.

Key Points: Managing Asthma in Children 0 to 4 Years of Age

- Diagnosing asthma in infants is often difficult. Underdiagnosis and undertreatment are key problems in this age group. However, not all wheeze and cough are caused by asthma, and caution is needed to avoid giving inappropriate prolonged asthma therapy **(EPR—2 1997)**. Thus, a diagnostic trial of asthma medications may be helpful.
- Treatment for young children, especially infants, who have asthma has not been studied adequately. Most recommendations for treatment are based on limited data and extrapolations from studies in older children and adults.
- The initiation of long-term control therapy:
    - Is recommended for reducing impairment and risk of exacerbations in infants and young children who had four or more episodes of wheezing in the past year that lasted more than 1 day and affected sleep AND who have either (1) one of the following: a parental history of asthma, a physician's diagnosis of atopic dermatitis, or evidence of sensitization to aeroallergens OR (2) two of the following: evidence of sensitization to foods, ≥4 percent peripheral blood eosinophilia, or wheezing apart from colds **(Evidence A)**.
    - Should be considered for reducing impairment in infants and young children who consistently require symptomatic treatment more than 2 days per week for a period of more than 4 weeks **(Evidence D)**.
    - Should be considered for reducing risk in infants and young children who have two exacerbations requiring systemic corticosteroids within 6 months **(Evidence D)**.
    - May be considered for use only during periods, or seasons, of previously documented risk for a child **(Evidence D)**.
- When initiating daily long-term control therapy, daily ICS is the preferred treatment **(Evidence A)**. Alternative treatment options (listed here in alphabetical order) include cromolyn (**Evidence B**—extrapolated from studies in older children) or leukotriene receptor antagonist (LTRA) (montelukast). The initial choice of long-term control medication includes consideration of treatment effectiveness, the domain of particular relevance for the individual patient (impairment, risk, or both), the patient's history of previous response to therapies, the ability of the patient and family to use the medication

correctly, and anticipated patient and family adherence to the treatment regimen **(Evidence D)**.

- Response to therapy should be carefully monitored. If there is a clear and positive response for at least 3 months, a careful step down in therapy should be attempted to identify the lowest dose required to maintain control. If clear benefit is not observed within 4 to 6 weeks and patient/family medication technique and adherence are satisfactory, the therapy should be discontinued and alternative therapies or diagnoses should be considered **(Evidence D)**.
- Administration of an ICS early in the course of the disease will not alter the underlying progression of the disease **(Evidence A)**. ICSs should be used to control symptoms, prevent exacerbations, and improve the child's quality of life, but their use should not be initiated or prolonged for the purpose of changing the progression or underlying severity of the disease.

Note: The following recommendations for different steps of pharmacologic therapy to gain and maintain asthma control are intended to be general guidelines for making therapeutic decisions. They are not intended to be prescriptions for individual treatment. Specific therapy should be tailored to the needs and circumstances of individual patients. Pharmacologic therapy must be accompanied at every step by measures to control those environmental factors and comorbid conditions that can impede asthma control and by patient education. (See the NGC summaries of the NAEPP guidelines, Education for a Partnership in Asthma Care and Control of Environmental Factors and Comorbid Conditions That Affect Asthma).

Treatment: Pharmacologic Issues for Children 0–4 Years of Age

The Expert Panel recommends that treatment of young children is often in the form of a therapeutic trial; therefore, it is essential to monitor the child's response to therapy. If there is no clear response within 4 to 6 weeks, the therapy should be discontinued and alternative therapies or alternative diagnoses considered **(Evidence D)**. If there is a clear and positive response for at least 3 months, a step down in therapy should be undertaken to the lowest possible doses of medication required to maintain asthma control **(Evidence D)**.

Treatment: Pharmacologic Steps for Children 0 to 4 Years of Age

Intermittent Asthma

Step 1 Care, Children 0 to 4 Years of Age

The Expert Panel recommends the following treatment for intermittent asthma:

- SABA taken as needed to treat symptoms is usually sufficient therapy for intermittent asthma **(EPR—2 1997)**.
- The Expert Panel recommends the following actions for managing exacerbations due to viral respiratory infections, which are especially common in children **(EPR—2 1997)**. These exacerbations may be intermittent yet severe.
    - If the symptoms are mild, SABA (every 4 to 6 hours for 24 hours, longer with a physician consult) may be sufficient to control symptoms

and improve lung function. If this therapy needs to be repeated more frequently than every 6 weeks, consider a step up in long-term care.
    - If the viral respiratory infection provokes a moderate-to-severe exacerbation, a short course of oral systemic corticosteroids should be considered (1 mg/kg/day prednisone or equivalent for 3 to 10 days).
    - For those patients who have a history of severe exacerbations with viral respiratory infections, consider initiating oral systemic corticosteroids at the first sign of the infection.
- The Expert Panel recommends that a detailed written asthma action plan be developed for those patients who have intermittent asthma and a history of severe exacerbations **(Evidence B)**. (See the NGC summary of the NAEPP guideline, Education for a Partnership in Asthma Care).

Persistent Asthma

The Expert Panel recommends the following therapy for persistent asthma:

- Daily long-term control medication at step 2 or above is recommended for children who had four or more wheezing episodes in 1 year and risk factors for persistent asthma **(Evidence A)**. Consider daily therapy for children who have a second exacerbation requiring oral systemic corticosteroids in 6 months or children who consistently require symptomatic treatment >2 days a week for > 4 weeks **(Evidence D)**.
- Quick-relief medication must be available. SABA should be taken as needed to relieve symptoms **(EPR—2 1997)**. The intensity of treatment will depend on the severity of the exacerbation (See the NGC summary of the NAEPP guideline, Managing Exacerbations of Asthma).
- To gain more rapid control of asthma, a course of oral systemic corticosteroids may be necessary for the patient who has an exacerbation at the time long-term control therapy is started or in patients who have moderate or severe asthma with frequent interference with sleep or normal activity **(EPR—2 1997)**.
- Close monitoring of the child's response to therapy is recommended **(EPR—2 1997)**; treatment recommendations are based on limited data in this age group, and thus treatment is often in the form of a therapeutic trial. If no clear response occurs within 4 to 6 weeks and medication technique and adherence are satisfactory, the treatment should be discontinued and a change in therapy or alternative diagnoses should be considered. If there is a clear and positive response for at least 3 months, a step down in therapy should be undertaken to the lowest possible doses of medication required to maintain asthma control **(Evidence D)**.
- Giving daily therapy only during specific periods of previously documented risk for a child may be considered **(Evidence D)**.

Step 2 Care, Children 0 to 4 Years of Age

- Preferred treatment for step 2 care is daily ICS at a low dose (**Evidence A** based on studies of individual drug efficacy in this age group; comparator trials are not available).
- Alternative, but not preferred, treatments include (listed in alphabetical order) cromolyn (**Evidence B**—extrapolated from studies in older children) and montelukast **(Evidence A)**. If an alternative treatment is selected and

adequate asthma control is not achieved and maintained in 4 to 6 weeks, then discontinue that treatment and use the preferred medication before stepping up therapy.

- Theophylline is not recommended as alternative treatment **(EPR—2 1997)** because of its erratic metabolism during viral infections and febrile illness in children less than 5 years of age and the need to closely monitor and control serum concentrations.

Step 3 Care, Children 0 to 4 Years of Age

- Medium-dose ICS is the preferred step 3 treatment **(Evidence D)**. The Expert Panel recommends increasing the dose of ICS, for children 0 to 4 years of age whose asthma is not well controlled on low doses of ICS, to ensure that an adequate dose is delivered (due to the inherent difficulty and variability of delivering aerosols) before adding adjunctive therapy **(Evidence D)**.

Step 4 Care, Children 0 to 4 Years of Age

- Medium-dose ICS AND either (listed in alphabetical) long-acting beta$_2$–agonists (LABA) or montelukast is the preferred treatment for step 4 **(Evidence D)**. Theophylline is not recommended as add-on therapy **(EPR—>2 1997)**.

Step 5 Care, Children 0 to 4 Years of Age

- High-dose ICS AND either LABA or montelukast is the preferred treatment **(Evidence D)**.

Step 6 Care, Children 0 to 4 Years of Age

- High-dose ICS AND either LABA or montelukast AND oral systemic corticosteroids may be given for step 6 **(Evidence D)**.

Key Points: Managing Asthma in Children 5 to 11 Years of Age

- Classification of severity, considering the new dimensions of both the impairment and risk domains, should guide decisions for initiating therapy in children not currently taking long-term control medications **(EPR—2 1997)**.
- Assessment of asthma control, considering both the impairment and risk domains, should guide decisions for adjusting therapy—either stepping up **(Evidence A)** or stepping down **(Evidence D)**.
- When initiating daily long-term control therapy for persistent asthma, daily ICS is the preferred treatment **(Evidence A)**; alternative treatment options include cromolyn, LTRA, and theophylline **(Evidence B)**. The choice of medication includes consideration of treatment effectiveness, the domain of particular relevance to the individual patient (impairment, risk, or both), the individual patient's history of previous response to therapies, the ability of the patient and family to use the medication correctly, and anticipated patient and family adherence with the treatment regime and cost **(Evidence D)**.

- Administration of ICS early in the course of the disease will not alter the underlying progression of the disease. ICSs should be used to control symptoms, prevent exacerbations, and improve the child's quality of life, but their use should not be initiated or prolonged for the purpose of changing the progression or underlying severity of the disease **(Evidence A)**.
- Children should be directly involved as much as possible in establishing goals for therapy and developing their written asthma action plans.
- Active participation in physical activities, exercise, and sports should be promoted **(EPR—2 1997)**. Treatment immediately before vigorous activity or exercise usually prevents EIB. If symptoms occur during usual play activities, a step up in treatment is warranted **(EPR—2 1997)**.
- A written asthma action plan should be prepared for the student's school, extended care, or camp, including the clinician's recommendation regarding self-administration of medication. Either encourage parents to take a copy to the child's school or obtain parental permission and send a copy to the school nurse or designee **(Evidence C)**.

Note: The following recommendations for pharmacologic therapy to gain and maintain asthma control (See figures 4–1b, 4–3b, 4–4a, b, and c in the original guideline document) are intended to be general guidelines for making therapeutic decisions. They are not intended to be prescriptions for individual treatment or to replace clinical judgment. Specific therapy should be tailored to the need and circumstances of individual patients. Pharmacologic therapy must be accompanied at every step by patient education and measures to control those environmental factors and comorbid conditions that can impede asthma control.

Treatment: Special Issues for Children 5 to 11 Years of Age

Pharmacologic Issues

The Expert Panel recommends that, when initiating daily long-term control therapy for mild or moderate persistent asthma, the choice of medication includes consideration of treatment effectiveness, the domain of particular relevance to the patient's asthma (impairment, risk, or both), the individual patient's history of previous response to therapies, the ability of the patient and family to use the medication correctly, anticipated patient and family adherence to the treatment regimen, and cost **(Evidence D)**.

The Expert Panel recommends that children $\geq$10 years of age (and younger children as appropriate) be directly involved in developing their written asthma action plans **(EPR—2 1997)**.

School Issues

The Expert Panel recommends that the clinician prepare a written asthma action plan for the student's school or childcare setting. Either encourage parents to take a copy to the child's school or obtain parental permission and send a copy to the school nurse or designee **(Evidence C)**.

Sports and Exercise Issues

The Expert Panel recommends that physical activity at play or in organized sports is an essential part of a child's life, and full participation in physical activities should be encouraged **(EPR—2 1997)**.

Treatment: Pharmacologic Steps for Children 5 to 11 Years of Age

Intermittent Asthma

Step 1 Care, Children 5 to 11 Years of Age

The Expert Panel recommends the following therapy for intermittent asthma (step 1 care):

- SABA, taken as needed to treat symptoms, is usually sufficient therapy for intermittent asthma.
- Manage moderate or severe exacerbations due to viral respiratory infections, especially common in children, with a short course of oral systemic corticosteroids. Consider initiating systemic corticosteroids at the first sign of infection in children who have a history of severe exacerbations with viral respiratory infections **(Evidence D)**.
- Provide a detailed written asthma action plan for those patients who have intermittent asthma and a history of severe exacerbations **(Evidence B)**.

Persistent Asthma

The Expert Panel recommends the following therapy for persistent asthma:

- Use daily long-term control medication. The most effective long-term control medications are those with anti-inflammatory effects, that is, those that diminish chronic airway inflammation and airway hyperresponsiveness **(Evidence A)**.
- Quick-relief medication must be available. SABA, taken as needed to relieve symptoms, is recommended **(Evidence A)**.
- To gain more rapid control of asthma, consider a course of oral systemic corticosteroids for the patient who has an exacerbation at the time long-term control therapy is started or in patients who have moderate or severe asthma with frequent interference with sleep or normal activity **(EPR—2 1997)**.
- Giving daily therapy only during specific periods of previously documented risk for a child may be considered **(Evidence D)**.
- Consider treating patients who had two or more exacerbations requiring oral systemic corticosteroids in the past year the same as patients who have persistent asthma, even in the absence of an impairment level consistent with persistent asthma **(Evidence D)**.

Step 2 Care, Children 5 to 11 Years of Age

- Daily low-dose ICS is the preferred step 2 treatment **(Evidence A)**.
- Alternative treatments at this step include (listed in alphabetical order) cromolyn, LTRA, nedocromil, and theophylline **(Evidence B)**.

Step 3 Care, Children 5 to 11 Years of Age

- Low-dose ICS plus the addition of some form of adjunctive therapy or medium-dose ICS are equivalent options in step 3 care, based on extrapolation from studies in adults (**Evidence B**—extrapolation). Because of the lack of comparative data in this age group, however, the adjunctive therapies are listed in alphabetical order: LABA, LTRA, or, with appropriate monitoring, theophylline.

Step 4 Care, Children 5 to 11 Years of Age

- Medium-dose ICS AND LABA is the preferred step 4 treatment (**Evidence B**—extrapolated from studies in youths ≥12 years and adults).
- Alternative, but not preferred, treatment is medium-dose ICS AND either LTRA or theophylline (**Evidence B**—extrapolated from studies in youths ≥12 years of age and adults).
- In the opinion of the Expert Panel, if the add-on therapy initially administered does not lead to improvement in asthma control, discontinue it and use a trial of a different add-on therapy before stepping up.

Step 5 Care, Children 5 to 11 Years of Age

- High-dose ICS AND LABA is the preferred step 5 treatment based on extrapolation from studies in older children and adults (**Evidence B**—extrapolated).
- Alternative, but not preferred, add-on treatments include LTRA or theophylline (**Evidence B**—extrapolated).

Step 6 Care, Children 5 to 11 Years of Age

- High-dose ICS AND LABA AND oral systemic corticosteroids long term is the preferred treatment **(Evidence D)**.
- Alternative, but not preferred, add-on treatments are either an LTRA or theophylline AND oral systemic corticosteroids **(Evidence D)**.

Definitions:

Levels of Evidence

The system* used to describe the level of evidence is as follows:

Evidence Category A: Randomized controlled trials (RCTs), rich body of data.
Evidence is from end points of well-designed RCTs that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of participants.

Evidence Category B: RCTs, limited body of data.
Evidence is from end points of intervention studies that include only a limited number of patients, post hoc or subgroup analysis of RCTs, or meta-analysis of RCTs. In general, category B pertains when few randomized trials exist; they are

small in size, they were undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.

Evidence Category C: Nonrandomized trials and observational studies. Evidence is from outcomes of uncontrolled or nonrandomized trials or from observational studies.

Evidence Category D: Panel consensus judgment.
This category is used only in cases where the provision of some guidance was deemed valuable, but the clinical literature addressing the subject was insufficient to justify placement in one of the other categories. The Panel consensus is based on clinical experience or knowledge that does not meet the criteria for categories A through C.

*Source: Jadad AR, Moher M, Browman GP, Booker L, Sigouin C, Fuentes M, Stevens R. Systematic reviews and meta-analyses on treatment of asthma: critical evaluation. *BMJ* 2000;320(7234):537-40.

Strength of Recommendations

In addition to specifying the level of evidence supporting a recommendation, the Expert Panel agreed to indicate the strength of the recommendation. When a certain clinical practice "is recommended," this indicates a strong recommendation by the panel. When a certain clinical practice "should, or may, be considered," this indicates that the recommendation is less strong.

This distinction is an effort to address nuances of using evidence ranking systems. For example, a recommendation for which clinical RCT data are not available (e.g., conducting a medical history for symptoms suggestive of asthma) may still be strongly supported by the Panel. Furthermore, the range of evidence that qualifies a definition of "B" or "C" is wide, and the Expert Panel considered this range and the potential implications of a recommendation as they decided how strongly the recommendation should be presented.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Long-term control of asthma (i.e., reduced impairment and reduced risk) with the least amount of medication and hence minimal risk for adverse effects

POTENTIAL HARMS

Adverse effects of medications used for control of asthma

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

These guidelines are intended to inform, not replace, clinical judgment. Of course, the clinician and patient need to develop individual treatment plans that are tailored to the specific needs and circumstances of the patient.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Foreign Language Translations
Patient Resources
Quick Reference Guides/Physician Guides
Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Managing asthma long term in children 0-4 years of age and 5-11 years of age. In: National Asthma Education and Prevention Program (NAEPP). Expert panel report 3: guidelines for the diagnosis and management of asthma. Bethesda (MD): National Heart, Lung, and Blood Institute; 2007 Aug. p. 281-325. [84 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1997 (revised 2007 Aug)

GUIDELINE DEVELOPER(S)

National Asthma Education and Prevention Program - Federal Government Agency [U.S.]
National Heart, Lung, and Blood Institute (U.S.) - Federal Government Agency [U.S.]

GUIDELINE DEVELOPER COMMENT

The National Asthma Education and Prevention Program Science Base Committee is a multidisciplinary group of clinicians and scientists with expertise in asthma management. The group includes health professionals in the areas of general medicine, family practice, pediatrics, emergency and critical care, allergy, pulmonary medicine, pharmacy, and health education.

SOURCE(S) OF FUNDING

The development of this report was entirely funded by the National Heart, Lung, and Blood Institute, National Institutes of Health.

GUIDELINE COMMITTEE

National Asthma Education and Prevention Program (NAEPP) Coordinating Committee
Third Expert Panel on the Diagnosis and Management of Asthma

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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See the original guideline document for members of the National Asthma Education and Prevention Program (NAEPP) Coordinating Committee, a list of consultant reviewers, and members of the National Heart, Lung, and Blood Institute and American Institutes for Research staffs.

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Development of the resource document and the guidelines report was funded by the National Heart, Lung, and Blood Institute (NHLBI), and National Institutes of Health (NIH). Expert Panel members completed financial disclosure forms, and the Expert Panel members disclosed relevant financial interests to each other prior to their discussions. Expert Panel members participated as volunteers and were compensated only for travel expenses related to the Expert Panel meetings. Financial disclosure information covering the 3-year period during which the guidelines were developed is provided for each Panel member below.

Dr. Busse has served on the Speakers' Bureaus of GlaxoSmithKline, Merck, Novartis, and Pfizer; and on the Advisory Boards of Altana, Centocor, Dynavax, Genentech/Novartis, GlaxoSmithKline, Isis, Merck, Pfizer, Schering, and Wyeth. He has received funding/grant support for research projects from Astellas, AstraZeneca, Centocor, Dynavax, GlaxoSmithKline, Novartis, and Wyeth. Dr. Busse also has research support from the NIH.

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Dr. Evans has received funding/grant support for research projects from the NHLBI.

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Dr. Meyer has no relevant financial interests.

Dr. Nelson has served on the Speakers' Bureaus of AstraZeneca, GlaxoSmithKline, Pfizer, and Schering-Plough; and as a consultant for Abbott Laboratories, Air Pharma, Altana Pharma US, Astellas, AstraZeneca, Curalogic, Dey Laboratories, Dynavax Technologies, Genentech/Novartis, GlaxoSmithKline, Inflazyme Pharmaceuticals, MediciNova, Protein Design Laboratories, Sanofi-Aventis, Schering-Plough, and Wyeth Pharmaceuticals. He has received funding/grant support for research projects from Altana, Astellas, AstraZeneca, Behringer, Critical Therapeutics, Dey Laboratories, Epigenesis, Genentech, GlaxoSmithKline, Hoffman LaRoche, IVAX, Medicinova, Novartis, Sanofi-Aventis, Schering-Plough, Sepracor, TEVA, and Wyeth.

Dr. Platts-Mills has served on the Advisory Committee of Indoor Biotechnologies. He has received funding/grant support for a research project from Pharmacia Diagnostics.

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Dr. Shapiro (deceased) served on the Speakers' Bureaus of AstraZeneca, Genentech, GlaxoSmithKline, IVAX Laboratories, Key Pharmaceuticals, Merck, Pfizer Pharmaceuticals, Schering Corporation, UCB Pharma, and 3M; and as a

consultant for Altana, AstraZeneca, Dey Laboratories, Genentech/Novartis, GlaxoSmithKline, ICOS, IVAX Laboratories, Merck, Sanofi-Aventis, and Sepracor. She received funding/grant support for research projects from Abbott, AstraZeneca, Boehringer Ingelheim, Bristol-Myers-Squibb, Dey Laboratories, Fujisawa Pharmaceuticals, Genentech, GlaxoSmithKline, Immunex, Key, Lederle, Lilly Research, MedPointe Pharmaceuticals, Medtronic Emergency Response Systems, Merck, Novartis, Pfizer, Pharmaxis, Purdue Frederick, Sanofi-Aventis, Schering, Sepracor, 3M Pharmaceuticals, UCB Pharma, and Upjohn Laboratories.

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Dr. Szefler has served on the Advisory Boards of Altana, AstraZeneca, Genentech, GlaxoSmithKline, Merck, Novartis, and Sanofi-Aventis; and as a consultant for Altana, AstraZeneca, Genentech, GlaxoSmithKline, Merck, Novartis, and Sanofi-Aventis. He has received funding/grant support for a research project from Ross.

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Dr. Yawn has served on the Advisory Boards of Altana, AstraZeneca, Merck, Sanofi-Aventis, and Schering-Plough. She has received honoraria from Pfizer and Schering-Plough, and funding/grant support for research projects from the Agency for Healthcare Research and Quality, the CDC, the NHLBI, Merck, and Schering-Plough.

Financial disclosure information covering a 12 month period prior to the review of the guidelines is provided in the original guideline document for each consultant reviewer.

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: National Asthma Education and Prevention Program Expert Panel Report: guidelines for the diagnosis and management of asthma update on selected topics-2002. J Allergy Clin Immunol 2002 Nov;110(5 pt 2):S141-219.

GUIDELINE AVAILABILITY

Electronic copies: Available from the National Heart, Lung, and Blood Institute Web site.

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Guidelines for the diagnosis and management of asthma. Summary report 2007. Bethesda (MD): National Heart, Lung, and Blood Institute; 2007. Available from the National Heart, Lung, and Blood Institute Web site.
- Overall methods used to develop this report. Electronic copies: Available from the National Heart, Lung, and Blood Institute Web site.
- Search strategies. Electronic copies: Available from the National Heart, Lung, and Blood Institute Web site.
- Evidence tables. Electronic copies: Available from the National Heart, Lung, and Blood Institute Web site.
- Lung diseases information. Information for health professionals. Electronic copies: Available from the National Heart, Lung, and Blood Institute Web site.

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

Additional tools, including sample monitoring records, can be found in the original guideline document.

PATIENT RESOURCES

The following is available:

- Lung diseases information. Information for patients and the public.

Electronic copies: Available from the National Heart, Lung and Blood Institute Web site.

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

This summary was completed by ECRI on January 5, 1999. The information was verified by the guideline developer on April 30, 1999. This summary was updated by ECRI on January 31, 2003. This information was not verified by the guideline developer. This summary was updated by ECRI on December 5, 2005 following the U.S. Food and Drug Administration (FDA) advisory on long-acting beta2-adrenergic agonists (LABA). This NGC summary was updated by ECRI Institute on January 14, 2008.

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Date Modified: 9/22/2008