An Overview of Asthma - Diagnosis and Treatment

Asthma is a common chronic disorder of the airways that is complex and characterized by variable and recurring symptoms, airflow obstruction, bronchial hyperresponsiveness, and an underlying inflammation. The interaction of these features of asthma determines the clinical manifestations and severity of asthma, and the response to treatment.

Asthma can vary among individuals, and its progression and symptoms can vary within an individual’s experience over time. The course of asthma over time, either remission or increasing severity, is commonly referred to as the natural history of the disease. We know little about the exact causes of asthma or the prevention of asthma, but we do how to control the symptoms and inflammation of asthma. Asthma is not currently curable, but it is treatable.

Diagnosing asthma remains a challenge, especially in young children (0-5). The symptoms are variable and, depending on environmental triggers and baseline health risks, may be severe and can lead to near fatal or fatal exacerbations. When uncontrolled, symptoms of asthma may include wheezing, cough, shortness of breath, or chest tightness. Symptom control does not always correlate with disease control, so objective monitoring of airway obstruction with or without inflammation is important.

Once diagnosed, it is important for the child and family to develop a partnership with their health care providers to establish an asthma control strategy that will allow the child and family to:

- Understand basics about asthma pathophysiology,
- Increase awareness of an individual’s specific triggers and what preventive/avoidance steps to take to minimize exposure to asthma triggers,
- Use the most appropriate, cost-effective medications to keep asthma under control, and
- Obtain an individualized written asthma action plan that assists the child and family (and any others that provide care, e.g., daycare provider, school staff) to learn and develop effective asthma self-management skills.

Children with asthma and their families must have access to culturally appropriate primary and specialty asthma care, culturally appropriate asthma education, and the necessary medications and related devices for effective asthma self-management. More often than not, many children and their families encounter barriers to accessing quality appropriate care and educational services due to a number of social and economic issues. Some children may have access to care, but lack the coordination of care that is necessary for daily management of asthma.

Research has shown that multi-faceted home interventions that are tailored to address a child’s asthma triggers are effective in controlling asthma symptoms and reducing other measures of asthma morbidity (NCHH, 2009). Reducing Environmental Triggers of Asthma (RETA) was a demonstration project coordinated by the Minnesota Department of Health, and addressed environmental factors in the home using family-specific, inexpensive interventions. A respiratory therapist who was also a certified asthma
educator provided in-home asthma education, assessed the home for environmental asthma triggers, and placed family-specific low cost products intended to minimize exposure to triggers. The most common interventions were bed and pillow encasements, portable high efficiency particulate air (HEPA) cleaners and vacuum cleaners. There were 64 low-income children from the Twin Cities Metropolitan Area enrolled, and 12 months post intervention results showed a statistically significant improvement in hospitalizations, urgent care visits, missed school days and quality of life indicators (such as sleeping through the night and being more active). The average cost of the interventions was $468 and assuming the costs of health service utilization was $2,428 (1 hospital visit (2004) and 2 unscheduled office visits (2006)), the costs saved by implementing the RETA interventions were estimated to be approximately $1,960 per child. The fact sheet for this project is included as an attachment.

Our current understanding of asthma is that it is a multi-factorial disease that is associated with familial, infectious, allergenic, socioeconomic, psychosocial, and environmental factors. How these factors interact to cause asthma is not known. However, we do know that asthma morbidity and mortality are largely preventable. By providing care in a collaborative environment that incorporates appropriate medical management and patient education and by establishing public policies that support families, children with asthma can lead healthy normal lives.

**Summary of National Institutes of Health Asthma Guidelines**

To assist health care professionals in bridging the gap between current knowledge and practice, the National Asthma Education and Prevention Program (NAEPP) of the National Heart, Lung, and Blood Institute (NHLBI) Published, the Expert Panel Report 3 (EPR-3 2007): Guidelines for the Diagnosis and Management of Asthma. The guidelines present basic recommendations for the diagnosis and management of asthma that help clinicians, children, and families make appropriate decisions about asthma care. The guidelines organize recommendations for the treatment of asthma around four components of asthma diagnosis and management:

1. Measures of assessment and monitoring, obtained by objective tests, physical examination, patient history and patient report, to diagnose and assess the characteristics and severity of asthma and to monitor whether asthma control is achieved and maintained,
2. Education for a partnership in asthma care (includes the child, his or her family, clinicians, school health offices, etc.),
3. Control (or elimination) of environmental factors and co-morbid conditions that affect asthma,
4. Comprehensive pharmacologic therapy for long-term management and to manage asthma exacerbations.

The complete version of the most recent NHLBI guidelines is available on the web at: [http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf](http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf). The National Guidelines were developed by an expert panel. The guidelines and recommendations are based on current scientific evidence. The Minnesota ICSI asthma guidelines closely mirror the EPR – 3 guidelines.
Component 1: Measures of Asthma Assessment and Monitoring (Severity & Control)

The functions of assessment and monitoring are closely linked to concepts of severity, control, and responsiveness to treatment. Severity is the intrinsic intensity of the disease process. Severity is measured most easily and directly in a child not receiving long-term control therapy. Control is the degree to which the manifestations of asthma (symptoms, functional impairments, and risks of untoward events) are minimized and the goals of therapy are met. Responsiveness is the ease with which asthma control is achieved by therapy. Asthma severity and asthma control include the domains of current impairment and future risk. Impairment is the frequency and intensity of symptoms and functional limitations the child is currently experiencing or has recently experienced. Risk is the likelihood of either asthma exasperations, progressive decline in lung function (or lung growth), or risk of adverse effects from medication. This distinction emphasizes the multifaceted nature of asthma and the need to consider separately asthma’s current, ongoing effects on the present quality of life and functional capacity and the future risk of adverse events. The two domains may respond differentially to treatment.

The specific measures used to assess severity and control are similar and include: symptoms, use of Short-Acting Beta-2 Agonists (SABAs) for quick relief of symptoms, limitations to normal activities due to asthma, pulmonary function, and exacerbations.

The concepts of severity and control are used as follows for managing asthma:

- Assess severity to initiate therapy,
- Assess control to adjust therapy,
- For assessing a child’s overall asthma severity, once the most optimal asthma control is achieved and maintained.

Asthma is diagnosed based on a child’s medical history, physical examination, pulmonary function tests, and laboratory test results. The EPR-3 2007 guidelines recommend spirometry for the diagnosis of asthma in children five years and older, as is also stated in the ICSI guidelines (ICSI, 2008).

For the initial assessment to characterize a child’s asthma and guide decisions for initiating therapy, health care providers should use information from the diagnostic evaluation to:

- Classify asthma severity,
- Identify precipitating factors for episodic symptoms (e.g., exposure at home, daycare, or school to inhalant allergens or irritants),
- Identify co-morbid conditions that may impede asthma management (e.g., sinusitis, rhinitis, GERD, OSA, obesity, stress or depression),
- Assess the child and family’s knowledge and skills for self-management.

For periodic monitoring of asthma control which will guide decisions for maintaining or adjusting therapy:
• Instruct children and caregivers to monitor their asthma control in an ongoing manner. All children and caregivers should be taught how to recognize inadequate asthma control,
  o Either symptom or peak flow monitoring is appropriate for most children,
  o Consider daily peak-flow monitoring for children who have moderate or severe persistent asthma, children who have a history of severe exacerbations, and children who poorly perceive airway obstruction or worsening asthma,
• Monitor asthma control periodically in clinical visits because asthma is highly variable over time and therapy may need to be adjusted,
• Assess asthma control, medication technique, the written asthma action plan, adherence, and child and caregiver concerns at every patient visit,
• Use spirometry to obtain objective measures of lung function.

Component 2: Education for a Partnership in Care
A partnership between the clinician, the child who has asthma, and the caregiver is required for effective asthma management. By working together, an appropriate treatment can be selected, and the child and family can learn self-management skills necessary to control asthma. Education should include basic facts about asthma, how medications work, inhaler technique, a written asthma action plan, environmental control measures, and emphasis on the need for regular follow-up visits, as stated in the ICSI guidelines (ICSI, 2008). Self-management education improves patient outcomes, and can be cost effective. Self-management education is an integral component of effective asthma care and should be treated as such by health care providers and those who develop health care policies and reimbursements.

Asthma self-management education should include the following:
• Develop an active partnership with the child and family,
• Provide all children with a written asthma action plan that includes instructions for both daily management (long-term medication, if appropriate, and environmental control measures) and actions to manage worsening symptoms (what signs, symptoms, and Peak Expiratory Flow (PEF) measurements indicate worsening asthma; what medications to take in response; what signs and symptoms indicate the need for immediate medical care),
• Integrate asthma self-management education into all aspects of asthma care,
  o Begin at the time of diagnosis and continue through follow-up care,
  o Involve all members of the health care team, including physicians, nurses, pharmacists, respiratory therapists, and asthma educators, as well as other health professionals who come in contact with asthma patients and families,
  o Occurs at all points of care where health care professionals interact with children who have asthma. Evidence supports education provided in clinics, children’s homes, pharmacies, targeted education in emergency departments and hospitals, and selected programs in schools and other community sites,
• Encourage adherence to the written asthma action plan,
• Encourage health care provider and health care system support of the therapeutic partnership.

Component 3: Control of Environmental Factors and Co-morbid conditions that affect asthma

If children who have asthma are exposed to irritants or inhalant allergens to which they are sensitive, their asthma symptoms may increase and precipitate an asthma exacerbation. Substantially reducing exposure to these factors may reduce inflammation, symptoms, and need for medication. Common asthma triggers include: cigarette smoke, dust mites, pollen and outdoor air pollution, pets, mice, rats, cockroaches, indoor mold, wood smoke, strong odors and sprays, cold air, and changes in the weather. Several co-morbid conditions can also impede asthma management. Common co-morbid conditions that can impede asthma management include: Allergic Bronchopulmonary Aspergillosis (ABPA), Gastroesophageal Reflux (GERD), Obesity, Obstructive Sleep Apnea (OSA), Rhinitis or Sinusitis, Stress, and Depression.

With regard to allergens and irritants health care providers should

• Evaluate the potential role of allergens (particularly inhalant allergens) and pollutants or irritants,
  o Allergy testing is recommended in children with persistent asthma who are exposed to perennial indoor allergens,
• Advise families with children with asthma to reduce exposures to allergens and pollutants or irritants to which they are sensitive,
• Effective allergen avoidance requires a multi-faceted, comprehensive approach; single steps alone are generally ineffective. Multifaceted allergen-control education programs provided in the home setting can help families reduce their child’s exposure allergens and consequently can improve asthma control,
• Refer caregivers who smoke to smoking cessation program to reduce the child’s exposure to environmental tobacco smoke,
• Consider subcutaneous allergen immunotherapy for children who have persistent asthma when there is clear evidence of a relationship between symptoms and exposure to an allergen to which the child is sensitive,
• Consider inactivated influenza vaccination for children who have asthma,
• Identify and treat co-morbid conditions that may impede asthma management. If these conditions are treated appropriately, asthma control may improve.

Component 4: Medications

Medications for asthma are categorized into two general classes: long-term control medication and quick-relief medication. Selection of medications should include consideration of the general mechanism and role of the medication in therapy, delivery devices, and safety. Long-term control medications are used daily to achieve and maintain control of persistent asthma. The most effective are those that attenuate the underlying inflammation characteristic of asthma. Quick-relief medications are used to treat acute symptoms and exacerbations. Children and families should be instructed in the use of inhaled medications, and the child’s technique should be reviewed at every patient visit.
For information on specific medications refer to the National Asthma guidelines found at www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf

References


