



# Pediatric Clips

**NURSING**

## *Pediatric Asthma*

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November 2008 • Volume 6

Pediatric Nursing Clips by Pediatric Advanced Practice Nurses at Dayton Children's provides quick reviews of common pediatric conditions.

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### CASE STUDY

DD, a 14-year-old biracial male, was referred to the pulmonary department with moderate persistent asthma. DD was diagnosed with asthma at 3 years of age. At time of initial visit, DD and his mother state that he awakens with coughing and experiences cough and chest pain with activity. He has experienced symptoms of heartburn. DD wishes to participate in basketball, however he has missed a lot of school. Family history is positive for asthma in his parents and maternal grandmother.

Environmental exposures include a dog, tobacco smoke and mold. Past medical history includes eczema, headaches and severe snoring. Currently DD is taking Advair 250/50, Singulair and using Albuterol MDI three to four times daily. He has completed three courses of oral steroids in the last six months.

#### DIAGNOSTIC WORKUP

Sinus x-rays: Normal  
Chest x-ray: Normal  
Echocardiogram: Normal

Pre/post pulmonary function test:  
Moderate Obstructive Impairment with significant improvement in airflow post bronchodilator (21% change FEV1 pre to post)  
IGE: 215 (0-85)  
RAST Panel 1: Class IV reaction to cats and dust, Class III to dog and alternaria, Class I to ragweed  
CBC: Hgb 16.1/Hct 47.2, Eosinophil 8.0 (0-3)

### CASE DISCUSSION

More than 22 million Americans have asthma, one of the most common chronic diseases of childhood, affecting an estimated six million children. Although it affects children of all ages, races, ethnicities and incomes, it afflicts African American and poor children disproportionately. The prevalence of asthma among young children has continued to increase in the past two decades, despite increased understanding of its causes and treatments.

Asthma is a complex disorder characterized by variable and recurring symptoms, airflow obstruction, bronchial hyper responsiveness and an underlying inflammation. This inflammation causes normal function of the airways to become excessive and overreactive, producing increased mucus, mucosal swelling and muscle contraction. This produces symptoms of airway obstruction, chest tightness, coughing and wheezing. Symptoms occur or worsen in the presence of exercise, viral infection, inhaled allergens and irritants, changes in weather, strong emotional expression, stress and menstrual cycles. Each individual experiences a different level of severity. The ability to reverse this airflow limitation may be incomplete in some patients due to remodeling of airway structure.

The development of asthma appears to be multifactorial involving the interplay between genetics and environment. Asthma is known to have an inheritable component, but the specifics remain complex. Innate immunity also may play a role. This hygiene hypothesis states that certain infections early in life such as exposure to other children (older siblings or childcare), less frequent use of antibiotics and country living are associated with lower incidence of asthma whereas the absence of these factors leads to increase risk. No recommendations based on this hypothesis have been made. Finally, environmental factors are involved in this development. Airborne allergens and viral respiratory infections are two major environmental factors, as well as tobacco smoke, air pollution and diet.

Establishing the diagnosis of asthma requires three steps:

1. Symptoms of recurrent episodes of airflow obstruction or airway hyper responsiveness (ie, cough, wheeze, shortness of breath).
2. Airflow is at least partially reversible (ie, increase of 12% or greater in FEV1 from baseline measure after inhalation of short acting beta agonist - Albuterol/Xopenex).

3. Alternative diagnoses are excluded such as upper airway disease, obstructions involving large and small airways, aspiration or gastroesophageal reflux.

The goal of asthma management is to reduce impairment and reduce risk. This involves prevention of symptoms, minimize quick relief medication usage and maintain normal lung functioning and normal activity levels. Also, minimizing ED visits or hospitalizations and providing pharmacotherapy with minimal or no adverse side effects from this therapy. This is achieved by incorporating four components: assessment and monitoring, education, controlling environmental factors and comorbid conditions and medications, long-term control and quick relief.

1. Assessment and monitoring:
  - Assessing severity and initiating therapy in a stepwise approach
    - o Utilize lowest treatment required to maintain control
    - o Identify triggers
    - o Identify comorbid conditions
    - o Assess patient's knowledge and skills
  - Monitor asthma control by symptoms or peak flow monitoring and in clinical visits

*Continued*

Continued from the front.

2. Education:

- Self-management education (basic asthma facts, role of medication and skills)
- Provide written asthma action plan

3. Control of environmental factors and comorbid conditions:

- Identify and avoid triggers
- Consider allergen immunotherapy, influenza vaccination
- Identify and treat comorbid conditions (allergic bronchopulmonary aspergillosis, GERD, obesity, obstructive sleep apnea, rhinitis/sinusitis)

4. Medications:

- Long term control medications
  - o Corticosteroids
  - o Leukotriene modifiers (montelukast/Singulair)
  - o Long acting beta agonists (salmeterol/Serevent, formoterol/Foradil)
  - o Methyl xanthenes(theophylline)
  - o Cromolyn sodium and nedocromil
  - o Immunomodulators (omalizumab/Xolair)

- Quick relief medications

- o Anticholinergics (ipratropium/Atrovent, tiotropium/Spiriva)
- o Short acting beta agonists (albuterol, levalbuterol, pirbuterol)
- o Systemic corticosteroids

**CONCLUSION**

DD was started on an increased dose of Advair, 500/50, Spiriva and Prevacid. An IGE and RAST panel was drawn. Symptoms did not resolve and DD required hospitalization and initiation of daily oral corticosteroids. The initiation of Xolair was considered. Omalizumab (Xolair) is indicated for adults and children (12 years of age and older) with moderate to severe persistent asthma who have a positive skin test or in vitro reactivity to a perennial aeroallergen and whose symptoms are inadequately controlled with inhaled corticosteroids. Xolair has been shown to decrease the incidence of asthma exacerbations. Anaphylaxis has been reported to occur after the administration of Xolair. Because of the risk of

anaphylaxis after administration, it must be administered in a medical setting able to handle emergency care.

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**FEATURED NURSE SPECIALIST**



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handling the inpatient and outpatient care of infants, children and teens including acute and chronic pulmonary conditions. The staff in the pulmonary department developed the successful Asthma Care Program, which ensures children with asthma receive consistent, high-quality care as well as patient/family education. Expert care from our pulmonary medicine specialists is available at Dayton Children's main campus and at our Specialty Care Center – Warren County. For more information, call 937-641-3376.



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