ABSTRACT
According to the Centers for Disease Control and Prevention (CDC), asthma is a growing health problem in the United States; there are now 9 million children under the age of 18 diagnosed with this illness. As a chronic illness, asthma has a major impact on the life of the individual as well as the family. This article illustrates the process of incorporation of standardized guidelines for the management of pediatric asthma through the collaborative efforts of the nurse, family, and child. Inclusion of a written asthma management plan that is client specific can help to ensure successful management of this common and deadly childhood illness. It is essential that nurses focus on educating the families of children with asthma in an effort to assist them in managing this chronic illness. A case study approach is used to illustrate the complexity of the problem and facilitate the nurse’s understanding of the process of assessment of need.

Key Words: Asthma; Asthma management plan; Education; Family.
Asthma has become a source of healthcare resource use throughout the world, since it is now a major cause of death and disability. In the United States alone, 9 million children (12% of all children under the age of 18) have been diagnosed with asthma; more than 4 million have had an asthma attack in the past year (CDC, 2004). The incidence of the disease is higher in boys, in poor children, in children exposed to urban environmental contaminants, in children with lack of access to medical care, and in non-Hispanic black children (Focus on Asthma, 2005). Non-Hispanic blacks are more than twice as likely as Hispanic children to have had an asthma attack in the past year (CDC, 2004).

One of the most common chronic childhood illnesses, asthma is the leading cause of school absences (National Heart, Lung, and Blood Institute [NHLBI], 2001), with over 10 million school absences recorded each year due to asthma. Caring for children with asthma requires that parents take time away from work, which accounts for the indirect costs of the illness, now totaling more than $1 billion each year. More than 2.7 million healthcare provider visits are made each year in relation to children with asthma, and exacerbations of the disease account for more than 200,000 hospitalizations (Flores et al., 2002). The morbidity and mortality rates from asthma are dramatic; more than 5,000 die each year in the United States from asthma, but tragically most of these deaths are preventable (Focus on Asthma, 2005).

Research has shown that educating families... decreases symptoms and improves patient outcomes.

Family Education Is the Key to Management

Since every member of a family is affected when one member is diagnosed with a chronic illness (Lubkin & Larsen, 2002), educational programs should follow a family-centered model as a partnership in care (Clark & Partridge, 2002; Jokinen, 2004). Asthma requires the incorporation of self-management strategies into the family’s lifestyle, because exacerbations of asthmatic episodes affect school attendance, and the fear of hospitalization and death pose a real threat. Children with asthma fear the limitations of the disease as well as the very real threat of not being able to breathe (Boyle & Tang, 2004). Helping a family to manage the child’s self-care needs on a daily basis can instill confidence, decrease anxiety, and provide predictability to daily life (Focus on Asthma, 2005).

Caring for children with asthma requires that families understand therapeutic guidelines, but unfortunately, families often present with inadequate knowledge related to asthma and its management (Navaie-Waliser, Misener, Mersman, & Lincoln, 2004). Research has shown that offering educational programs to the families of children with asthma improves the perception of the disease process, decreases symptom persistence, facilitates treatment adherence and asthma control, and improves patient outcomes (Bonner et al., 2002; Ebbinghaus & Bahrainwala, 2003; Marosi & Steismeyer, 2001). It is incumbent upon nurses, therefore, to educate families about asthma and provide them with the tools necessary to assist their children manage the disease.

Developing a Plan of Care

The American Academy of Pediatrics endorses and accepts as its policy the National Asthma Education and Prevention Program Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma, which is based on the recommendations of the available scientific literature and consensus opinion of the NHLBI (American Academy of Pediatrics, 2005). As a comprehensive initiative to promote better health in children with asthma, the program focuses on the delivery of care, controlling triggers of an asthmatic episode, pharmacologic therapy, and education/management of exacerbations of the disease.

Management of exacerbations of asthma involves education to increase the client’s and his or her family’s knowledge regarding severity classification, triggers, and exercise. Weissman (2002) describes the severity classification of asthma as (1) mild intermittent, (2) mild persistent, (3) moderate persistent, and finally the most serious, (4) severe persistent. Incorporation of these classifications and knowledge regarding individual triggers (i.e., temperature changes, dust, food, air pollution, etc.) and the effects of exercise allow the nurse, working collaboratively with the client and family, to establish an individual plan of care (Braganza, Sharif, & Ozuah, 2003). Nursing interventions are then classified according to the activities associated with the age group of the child.

A daily management plan such as the one recommended by the American Lung Association adapted from guidelines set forth by the NHBLI (Figure 1) includes measures that assist families to maintain control over their children’s asthma. This plan addresses environmental and psychological issues that may serve as triggers of an asthma attack. The plan includes the individual’s asthma severity classification along with medications as a part of the management of the
### Asthma Action Plan

**General Information:**
- Name
- Emergency contact
- Physician/Health Care Provider

**Physician Signature**

<table>
<thead>
<tr>
<th>Severity Classification</th>
<th>Triggers</th>
<th>Exercise</th>
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<tbody>
<tr>
<td></td>
<td>Colds</td>
<td>1. Pre-medications (how much and where)</td>
</tr>
<tr>
<td></td>
<td>Smoke</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weather</td>
<td></td>
</tr>
<tr>
<td>Mild intermittent</td>
<td>Exercise</td>
<td>2. Exercise modifications</td>
</tr>
<tr>
<td>Moderate Persistent</td>
<td>Dust</td>
<td></td>
</tr>
<tr>
<td>Mild Persistent</td>
<td>Air pollution</td>
<td></td>
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<tr>
<td>Severe Persistent</td>
<td>Animals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food</td>
<td></td>
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<tr>
<td></td>
<td>Other</td>
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#### Green Zone: Doing Well

**Peak Flow Meter Personal Best =**

**Symptoms:**
- Breathing is good
- No cough or wheeze
- Can work and play
- Sleeps at night

**Control Medications**

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How Much to Take</th>
<th>When To Take It</th>
</tr>
</thead>
</table>

#### Yellow Zone: Getting Worse

**Contact Physician if using quick relief more than 2 times per week.**

**Symptoms:**
- Some problems breathing
- Cough, wheeze or chest tight
- Problems working or playing
- Wakes at night

**Peak Flow Meter**
- Between 50 to 80% of personal best or
- Between 10% to

**Control Medications**

<table>
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<th>Medicine</th>
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</table>

- IF your symptoms (and peak flow, if used) return to Green Zone after one hour of the quick-relief treatment, THEN
  - Take quick-relief medication every 4 hours for 1 to 2 days
  - Change your long-term control medicines by
  - Contact your physician for follow-up care
- IF your symptoms (and peak flow, if used) DO NOT return to the GREEN ZONE after 1 hour of the quick-relief treatment, THEN
  - Take quick-relief treatment again
  - Change your long-term control medicines by
  - Call your physician/health care provider within _______ hours of modifying your medication routine

#### Red Zone: Medical Alert

**Ambulance/Emergency Phone Number:**

**Symptoms:**
- Lots of problems breathing
- Cannot work or play
- Getting worse instead of better
- Medicine is not helping

**Peak Flow Meter**
- Between 0 to 50% of personal best or
- Between _______ to _______

**Control Medications**

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How Much to Take</th>
<th>When To Take It</th>
</tr>
</thead>
</table>

- Go to the hospital or call for an ambulance if
  - Still in the red zone after 15 minutes
  - If you have not been able to reach your physician/health care provider for help
- Call an ambulance immediately if the following danger signs are present
  - Trouble walking or talking due to shortness of breath
  - Lips or fingernails are blue
disease (Roy & Milgrom, 2003). An effective action plan should address the concerns of the family by providing them with vital information on the pathophysiology of asthma, the signs and symptoms of an episode, and measures of prevention to foster an understanding of the disease process.

Case Study
Adam is a 6-year-old African American male who enjoys playing with his stuffed animals and his dog, Wally. His favorite sport is soccer. Adam presented to the emergency department, accompanied by his mother, with an acute exacerbation of asthma. His mother stated that Adam has had a runny nose and a cough for the past 2 days. Adam has had previous hospital admissions since the age of 2 and is classified as having mild persistent asthma. His therapeutic regimen consists of Xopenex via nebulizer and Singulair via chewable tablet daily. On physical assessment, Adam is experiencing mild nasal flaring, expiratory wheezing, and suprasternal retractions. His room air saturation on pulse oximetry is 93%.

In developing a plan of care for Adam, the nurse should be aware of his knowledge level about the management of asthma as well as his family’s knowledge; this should be assessed prior to beginning teaching (Pender, Murdaugh & Parsons, 2002). The family’s educational background, primary language, and culture are also important (Andrews & Boyle, 2002; Leininger, 1991). Assessment of existing cultural practices supportive of health (including food choices) should be done and integrated into the overall health plan (Andrews & Boyle, 2002). Use of a cultural assessment guide could be helpful during this process (Andrews & Boyle, 2002; Leininger, 1991).

Elements of Family Assessment
Family assessment consists of three areas: demographics, geographic/residential factors, and medical history (AMMS Model, 2005).

Demographics
Knowing the child’s age is essential, because it connects the nurse to the appropriate growth and development tasks for the particular child. The successful completion of these tasks will influence the management of the individual’s asthma (Miller, 2000).

In Adam’s case, as a school-age child he will be affected by the diagnosis of asthma because his primary concern at this stage is taking initiative. According to Erikson, Adam’s stage of development is industry vs. inferiority (Erikson, 1993; Miller, 2000). He should progress from free-play to play that may be structured by rules and may demand formal teamwork. Since Adam had joined a soccer team, it is important that his asthma be controlled, because otherwise he will be limited to the length of time he plays on the field. An asthma management plan will address the need for prophylactic medication prior to an increase in his activity. This preventative measure will enhance Adam’s quality of life, allowing him the freedom to participate in the sport he loves.

Socioeconomic factors such as health insurance coverage also have an impact on asthma management. Lack of insurance contributes to the existing healthcare disparities associated with chronic illness, less ability to access appropriate health care, and lack of preventive care (Cloutier, Wakefield, Hall, & Bailit, 2002)

Adam’s mother is a young single parent who lives on a fixed income. She dropped out of high school in her junior year, and would like to get a GED “someday.” She had a job in a fast food place for a short time but found it difficult to find a babysitter for Adam. She also had asthma as a child but “outgrew” it, and she believes that Adam will do the same. Adam’s mother shops in the supermarket several blocks from her house, and usually purchases his favorite foods (eggs, cheese, milk, and chocolate) with food stamps. There have been several occasions when Adam’s mother did not pick up his medication from the pharmacy in a timely manner.

Geographic/Residential Factors
The environment in which an asthmatic child lives can have a profound effect on the ability to maintain control of asthmatic episodes (Krieger et al., 2002). The location (external environment) where the child lives along with housing (internal environment) will play a major role in how well the therapeutic regimen can be managed. For instance, living in a crowded apartment with a large amount of houseplants and domestic pets may place the child at risk, exposing them to triggers of asthma (Krieger et al., 2002).

Adam and his mother live in a low-income, subsidized project. She smokes at least one pack of cig-
Adam’s internal environment is not conducive to health for a child with asthma. The presence of triggers such as carpeting, abundance of stuffed animals, upholstered furnishings, a shedding dog, and large quantities of dust and rodents should be addressed. It will be important to supply Adam’s mother with the necessary education to help her decrease the exposure to triggers. She will need to learn that asthma triggers should be avoided, frequent vacuuming is essential, and stuffed animals should be avoided, as should live animals such as the dog that sheds. In addition, the internal environment heating and cooling system should be evaluated; optimal internal environment for Adam would be moist air, neither too cold nor too hot.

If the family had been living in a rural setting, assessment of asthmatic triggers such as grass, flowers, and trees would have been important. In addition, the temperature of the geographic area is important because cold, frigid temperatures are triggers for asthma attacks, as are very windy conditions (Krieger et al., 2002). Sometimes these triggers cannot be avoided, but if the family understands the triggers, that awareness can translate into appropriate action when the triggers appear.

Medical History

Medical history is also another important factor when assessing the educational needs of families who have a child with asthma. Variables to assess include the child’s age when the asthma first appeared and the severity of the disease process (this may be indicated by the child’s activity level as well as the duration, frequency, and severity of exacerbations of asthma).

Adam’s mother stated that he displays signs of respiratory difficulty such as nasal flaring, sternal retraction, and wheezing after soccer practice, and has been unable to run or play when experiencing shortness of breath.

Severity of the disease can be determined by the number of visits to the emergency department and the number of admissions to the hospital, as well as by intensive care unit admissions and intubations during admissions (Pendergraft et al., 2004).

Pulmonary function test results are important determinants of clinical severity. These tests provide an objective and reproducible method of evaluating the presence and degree of lung disease as well as the response to therapy (Malmberg et al., 2001). The clinical severity of the child’s asthma, in turn, will influence the focus of the education of the family.

The peak expiratory flow rate of an asthmatic child is another indicator of the clinical severity of the illness. A peak flow meter allows the family to monitor the child’s asthma for exacerbations and is a vital tool in management strategies. Education for the management of asthma must include direction in the use of the peak flow meter not only for exacerbations, but also for prevention. A peak flow meter is used to measure the amount of airflow in the airways. The peak flow rate is the rate of airflow when a person inhales fully and exhales as quickly as possible (for the test to be useful the child must be able to repeat the same flow rate at least three consecutive times). Peak flow rates decrease when asthma symptoms are worsening and increase when asthma treatment is working and the airway is open. Peak flow rates can also help identify triggers for the individual’s asthma (Medem Medical Library, 2005).

Presenting symptoms of an asthma attack should also be included in the medical history. The symptoms vary with individuals and may include prodromal itching localized at the front of the neck or the upper part of the back, irritability, restlessness, headache, and tightness in the chest. Any respiratory infection must be evaluated promptly. A common presenting symptom is the presence of a cough (Fardy, 2004).

The child’s asthma medications must also be included in the assessment. Medication plays two roles in the treatment and control of asthma: quick relief and long-term control. An understanding of the varied uses of asthma medications must be assessed. Quick-relief medications should not be used as maintenance therapy. Understanding the use of inhalers is imperative to effective disease management (Roy & Milgrom, 2003).

**Medication plays two roles in the treatment and control of asthma: quick relief and long-term control.**

**Clinical Implications**

Once the assessment is complete the nurse can tailor an educational program specific to the individual needs of the client and family. A client-specific written asthma action plan should be included (Figure 1). A review of several existing asthma education programs revealed that many are designed for large group settings (e.g., schools) or involve a
series of teaching sessions (Ebbinghaus & Bahrainwala, 2003). School-based asthma programs can help children with asthma experience fewer symptoms and also do better at school (Clark et al., 2004). Asthma education for children who are hospitalized involves both the child and the family and should begin at admission and continue through the child’s hospital stay (Ebbinghaus & Bahrainwala, 2003).

Client education should begin at diagnosis and be integrated into every step of healthcare. The key educational messages to include in an asthma program directed at families of children with asthma are basic facts about asthma, roles of medications, skills to enhance management (i.e., use of a peak flow meter, early signs of an asthma attack), relevant environmental control measures, and when and how to take action during an attack.

The goal of asthma education is to ensure that the child’s asthma is managed effectively. If the child with asthma can rely on his or her family and healthcare providers to recognize symptoms, diagnose the disease, and help manage it, the perception of asthma will be improved and symptom persistence will be decreased.

Adam’s Asthma Action Plan
A nurse formulating a teaching plan (Table 1) to manage Adam’s asthma would include his mother and any other family members in the plan and use the asthma action plan as a guide for teaching (Table 1). The severity of Adam’s asthma would be determined first (indicated on the top left of the asthma management plan). Adam would be classified as having mild persistent asthma because he has symptoms of asthma less than or equal to two times per day. These symptoms (wheezing on expiration, sternal retraction, and flaring nares) affect his ability to maintain his normal activity level. The nurse would also gather information regarding the prescribed medications and ascertain knowledge level for both Adam and his mother regarding these medications. After this assessment, the nurse would

<table>
<thead>
<tr>
<th>Identified Need</th>
<th>Nursing Action</th>
<th>Rationale</th>
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<tbody>
<tr>
<td>Determine asthma severity</td>
<td>According to the four categories delineating asthma severity--mild intermittent, mild persistent, moderate persistent, and severe persistent--determine the child’s asthma severity using the number of asthma attacks in the day and at night, the peak flow personal best reading, and the present reading.</td>
<td>Allows for individualization of the asthma action plan</td>
</tr>
<tr>
<td>Knowledge of medication regimen</td>
<td>Explain prescribed medications including proper use of a nebulizer and when and how much medication to take.</td>
<td>An effective asthma action plan addresses concerns of the family and provides vital information regarding measures of prevention and management of the illness.</td>
</tr>
<tr>
<td>Correct use of peak flow meter</td>
<td>1. Slide the little marker down as far as it will go. This sets the meter to 0. 2. Stand up. Take a big breath with your mouth open. Hold the meter in one hand. Keep your fingers away from the numbers. 3. Quickly close your lips firmly around the tube. Do not put your tongue in the hole. Blow one time as fast and hard as you can (a short powerful puff). 4. The marker will go up and stay up. Do not touch the marker. Find the number where the marker stopped. 5. Write the number on a piece of paper or on a chart. 6. Repeat the same test two more times. Push the button down each time. Write the number down each time.</td>
<td>Peak flow, when appropriate for the family, can help determine the proper zone.</td>
</tr>
<tr>
<td>Review of asthma action plan</td>
<td>Review each of the three zones and the identified triggers with the child and his family. Explain the course of action, including medications and equipment. Sign the asthma action plan and distribute one copy each to the child/family, school, and healthcare provider.</td>
<td>Asthma action plans are broken down into three zones, green (where the child should be everyday), yellow (child is symptomatic and unable to maintain normal activity level), and red (child needs urgent medical care). In each zone, the plan gives written instructions on how to handle each instance.</td>
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</table>
instruct Adam and his family using simple language about how to use a nebulizer correctly, including when and how many times. Together, the nurse, Adam, and his family would fill out the asthma management plan indicating the medication to take and how much.

The nurse would instruct Adam and his mother how to use a peak flow meter daily to determine the proper color zone for Adam. The asthma management plan addresses treatment options based on the zone the child is in at the time. Adam’s peak flow reading is 200, and his personal best is 250, putting Adam in the yellow zone. Here Adam and his mother would refer to the directions outlined for management in the yellow zone of his asthma action plan, including specific medications prescribed by his primary care provider (Xopenex and Singulair are prescribed for Adam). The asthma action plan specifically tells Adam and his mother what medication to take and how often. In addition, they are directed that a call should be placed to his primary care provider.

Finally, the nurse would review the identified triggers of Adam’s asthma and review the interventions delineated by each zone identified on the asthma action plan. The plan should then be signed by the nurse and Adam, and it acts as a contract. A copy of the written plan should be kept by the nurse, the original should be given to Adam and his mother, and the final copy should be given to Adam’s school.

It is essential that nurses focus on educating the families of children with asthma in an effort to assist them in managing this chronic illness. Adam’s case study illustrates the complexity of the problem and how nurses can educate families about asthma and provide them with the tools necessary to assist their children in managing the disease.

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