Helping Children Gain Asthma Control: Bundled School-Based Interventions

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Childhood asthma is a significant chronic disease in children under the age of 18 years, with between 6.7 and 9.6 million children affected in the U.S. alone (American Lung Association [ALA], 2010). Despite new medications and medical advances, asthma remains a significant cause of morbidity, school absenteeism, parent lost work days, emergency department (ED) visits, and hospitalizations for children world-wide (Brown, Gallagher, Fowler, & Wales, 2010; Martinez, 2009; Mattke, Martorell, Sharma, Malveaux, & Lurie, 2009). Bundled school-based interventions can help reduce asthma morbidity and ED visits for children with asthma (Perry & Toole, 2000).

Background

Definition of Asthma And Pathophysiology

The exact etiology of asthma remains unknown. Asthma is considered a chronic inflammation of the small and large airways with inflammatory cell infiltration involving neutrophils, eosinophils, lymphocytes, mast cell activation, and epithelial cell injury (National Heart, Lung and Blood Institute [NHLBI], 2007). There is evident bronchial hyper-responsiveness, airflow obstruction, and in some patients, sub-basement fibrosis and over-secretion of mucus (Moorman et al., 2007; NHLBI, 2007)Investigators have demonstrated that structural airway wall changes, or airway remodeling, can occur even in very young children (Canonica, 2006; Lemanske, 2002). Remodeling can lead to permanent lung damage and reduced lung function (Potts & Reagan, 2004). Acute asthma symptoms include bronchospasm, chest tightness, wheezing, cough, and difficulty breathing. Due to the chronicity and long-term inflammation, NHLBI (2007) guidelines recommend that children with persistent or daily symptoms take daily controller medication(s), which helps reduce troubling respiratory symptoms, airway remodeling, and disease progression.

Asthma Risk Factors

No one risk factor is responsible for asthma morbidity; rather, a plethora of factors contribute to the high prevalence, which vary dramatically among children with asthma (Clark, Mitchell, & Rand, 2009). Asthma risk factors include living in poverty in the inner-city, being uninsured or Medi-aid-enrolled, and being African American or Hispanic (Akinbami, Moorman, Garbe, & Sondik, 2009; Bloomberg et al., 2009; Gerald et al., 2009; Kruse, Deshpande, & Vezina, 2007; Liu & Pearlman, 2009; Mattke et al., 2009; Smith, 2009). The morbidity, mortality and hospitalization rates, and number of ED visits, are higher for children of minority racial backgrounds (Kruse et al., 2007; Liu & Pearlman, 2009; Peterson-Sweeney et al., 2007; Smith, 2009). Even though asthma prevalence is disproportionately high in low-income African-American and Hispanic children, there is low use of asthma controller medications among them (Mattke et al., 2009; Smith & Pawar, 2007; Stingo & Claudio, 2009; Williams et al., 2007; Wu, Smith, Bokhour, Hohman, & Lieu, 2008).

Exposure to environmental pollutants and sensitization to allergens at home and school are significant asthma risk factors (Abramson et al., 2006; Belanger, Kielb, & Lin, 2006; Bener, Kamal, & Shanks, 2007; Lanphear, Aligne, Auinger, Weitzman, & Byrd, 2001; McConnell et al., 2010). Some parents believe environmental allergens are unavoidable and fail to initiate any prevention measures, while other parents keep their child inside to try and avoid asthma triggers (Laster, Holsey, Shendell, McCarty, & Celano, 2009; Penza Clyve, Mansel, & McQuaid, 2004).

Other asthma morbidity risk factors include high parental stress, maternal health status, pessimistic asthma beliefs, poor child and parent self-efficacy, behavioral and emotional issues of the child, and exposure to tobacco smoke (Clay, Farris, McCarthy, Kelly, & Howarth, 2008; Kaiser, Barry, &
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Parents regarding the need for follow-up care (Zorc et al., 2009). Shields, Comstock, and Weiss (2004) found that Hispanic and African-American children were less likely than Caucasian children to receive follow-up care after an ED visit. Among children with moderate to severe asthma, Butz et al. (2004) discovered that children did not receive adequate asthma preventative care despite experiencing asthma symptoms. Children with a recent ED visit did have somewhat better care than children who did not have an ED visit (Butz et al., 2004).

Lack of capacity in the community for asthma follow up is a significant problem in some cities. Many low-income children on Medicaid use federally qualified community health centers (FQHCs) for primary care and asthma follow up. A recent survey by the Commonwealth Fund reported that although most FQHCs can provide onsite acute care, staff do not send reminders for regular follow-up care (Doty, Abrams, Hernandez, Stremliks, & Beal, 2010). Many low-income and minority children do not keep regular asthma appointments, which continues the cycle of using the ED for asthma care.

**Care Deficits for Childhood Asthma**

Mansour et al. (2000) conducted focus groups with African-American parents in the inner-city and found that commonly cited barriers to asthma care for children were related to parental health beliefs, as well as the social and physical environment. Seid (2008) also explored barriers to primary care and follow up for children with asthma, and found that parents reported long clinic waits, no transportation, feeling marginalized by health care providers, and parents’ certain expectations about care all interfered with accessing regular care. Parents also cited other family priorities and lacking skills and knowledge about asthma and health care as barriers. However, having health insurance, including Medicaid, has been associated with reduced barriers to care (Seid, 2008; Szilagyi et al., 2006).

Some families believe that children outgrow asthma and do not understand that asthma is a chronic inflammatory disease (Barton, Sulaiman, Clarke, & Abramson, 2005). Thus, some parents do not believe ongoing asthma management or regular medical follow up is needed (Bloomberg et al., 2009). Ayala et al. (2006) found that junior high school students believed they outgrew their asthma and their symptoms were not severe enough to warrant medical care. In a randomized controlled trial of 433 children, Zorc, Chew, Allen, and Shaw (2009) provided very specific instructions to parents regarding the need for follow up with the child’s primary care provider (PCP) after an asthma ED visit, as well as asthma information, a letter to take to their PCP, and follow-up reminders at 1, 3, and 6 months. PCP follow up during the month after the ED visit for the intervention families in the study was similar to the control subjects. Belief for the need for asthma follow up increased, but actual PCP follow up did not (Zorc et al., 2009). Shields, Comstock, and Weiss (2004) found that under-identification of asthma is 30%, in other U.S. cities (Centers for Disease Control and Prevention [CDC], 2009).

**Problems with Asthma Medications**

Every day, numerous children with asthma symptoms attend school without a rescue inhaler (short-acting bronchodilator for emergencies) or appropriately prescribed asthma controller medications. These children are at high risk for exacerbations and severe morbidity. Children come to school without medication for a variety of reasons. They often forget their medication when leaving the house and frequently have difficulty taking asthma medication or using an asthma inhaler properly (Ayala et al., 2006; Clay et al., 2008; Handelman, Rich, Bridgemohan, & Schneider, 2004; Penza-Clyve et al., 2004). Further, children often complain about the taste and side effects of the medications (Penza-Clyve et al., 2004).

Parents contribute to the problem by sometimes forgetting to give prescribed dosages and by lacking knowledge about the medications (Handelman et al., 2004; Porter, Kohane, & Goldmann, 2005; Riley-Lawless, 2009). Some families struggle with the cost of medications and remembering to refill medications monthly (Barton et al., 2005). Many parents think their children take too much medication or are afraid of the side effects of the medications, especially the steroid component in prescribed controller medications (Barton et al., 2005; Handelman et al., 2004; Karnick et al., 2007; Mansour et al., 2000; Orrell-Valente et al., 2007; Penza-Clyve et al., 2004; Smith & Pawar, 2007). Parents’ health beliefs also affect the child’s adherence to prescribed medications and medical follow up (Conn et al., 2005; Laster et al., 2009). In addition, some parents and providers underestimate the severity of the child’s asthma symptoms or the ability to achieve asthma control, and/or overestimate the child’s physical functioning (Barton et al., 2005; Dozier, Aligne, & Schlabach, 2006; Halterman et al., 2002; Taggart, Wittich, & Yawn, 2006).

**Asthma Identification And Prevalence in Schools**

Under-identification of asthma is another significant issue affecting asthma control at school. Prevalence rates vary by the definition of asthma and the screening tools used. In 2005, the Cincinnati Children’s Hospital Medical Center [CCHMC] Child Health Policy Research Center (2005) reported an asthma prevalence of 13.9% in Greater Cincinnati, but a prevalence of 21.8% among low-income, inner-city children. Cincinnati Public School (CPS) nurses, however, only reported an average of 11% for the same population (M.E. Crompton, personal communication, September 30, 2010). Mansour, Rose, Toole, Luzader, and Atherton (2008) reported asthma prevalence ranged from 13% to 18% in four school-based health centers (SBHCs) serving predominately low-income, African-American students in CPS. Prevalence has been reported even higher, up to 20%, in other U.S. cities (Centers for Disease Control and Prevention [CDC], 2009).

**Other Barriers Affecting Care At School**

There are other barriers to managing asthma at school, and addressing these barriers may improve the ability of children with asthma to par-
ticipate more fully in school (Forbis, Rammel, Huffman, & Taylor, 2006; Mansour et al., 2000). In CPS, barriers to care for children with asthma are similar to other metropolitan areas and include poverty (CPS has an overall average 66% poverty level based on federal guidelines for free and reduced lunch, with many schools over 80%), lack of transportation and health insurance, inconvenient clinic or physician office hours, lack of parental education on the need for asthma follow up, other family priorities, and not having a written asthma action plan (AAP) to guide care (Mansour et al., 2000, 2008; McMullen et al., 2007; Newacheck & Hafon, 2000).

Education-Based Asthma Programs

Many school-based and community-based interventions offer asthma education both with and without medical intervention, and have shown an increase in asthma knowledge, better self-regulation, and improved academic performance, but little or no change in asthma morbidity (Clark et al., 2009; Gerald et al., 2006; Valery et al., 2010). Children with moderate to severe asthma, however, have demonstrated better outcomes from asthma education than children with mild asthma (Guevara, Wolf, Grum, & Clark, 2003). Education has been shown to enhance the relationship between the health care provider and parent, which can improve adherence to medication (Petersen-Sweatney et al., 2007). Asthma education programs have also been associated with improved self-efficacy, reduction in asthma-related restricted activity, and fewer school absences and ED visits (Velsor-Friedrich, Pigott, & Srof, 2005). Some believe that education alone, however, cannot significantly reduce asthma morbidity without appropriate medication and regular medical care (Wheeler, Merkle, Gerald, & Taggart, 2006).

Evidence-Based Asthma Care

School asthma programs based on national practice guidelines encompassing both nursing and pharmacologic interventions have shown to be very effective in reducing asthma risk factors, including improved school attendance, reduced number of parent lost work days, urgent care visits, ED visits, and hospitalizations, and lower health care costs associated with childhood asthma (ALA, 2010; Anderson et al., 2004; Christiansen & Zuraw, 2002; Cicotto et al., 2005; Clark et al., 2004, 2010; DePue et al., 2007; Erickson, Spllett, Mullett, & Heiman, 2006; Guo et al., 2005; Lara et al., 2002; Levy, Heffner, Stewart, & Beeman, 2006; Liao, Morphew, Amarni, & Galant, 2006; Liu & Pearlman, 2009; Lurie, Bauer, & Brady, 2001; Lueblohga-Mukasa & Dunn-Georgiou, 2002; Moore, Uyeda, Cuevas, & Villanueva, 2010; Newacheck & Hafon, 2000; Reeves et al., 2006; Spllett, Erickson, Belseth, & Jensen, 2006; Tinkelman & Schwartz, 2004; Velsor-Friedrich, Pigott, & Louloudes, 2004; Webber, Carpinello, Oruwariye, & Appel, 2002; Webber et al., 2005; Wu et al., 2008). The Institute of Medicine defines clinical practice guidelines as “systematically developed statements to assist practitioners and patient decisions about appropriate healthcare care for specific clinical circumstances” (Field & Lohr, 1990, p. 38). Widely accepted evidence-based clinical guidelines for asthma include a) National Guideline Clearinghouse – Management of Asthma in Children 5 to 11 years (Agency for Healthcare Research and Quality [AHRQ], 2008), b) NHLBI (2003, 2007) National Asthma Education and Prevention Program (NAEPP) reports – Guidelines for the Diagnosis and Management of Asthma and Managing Asthma: A Guide for Schools, and (c) Global Initiative for Asthma (GINA) (2012) – Global Strategy for Asthma Management and Prevention.

Providers using the NAEPP guidelines have demonstrated improved outcomes for their patients, including improved medication adherence, fewer urgent care and ED visits, and fewer hospitalizations, especially among low-income, minority children (Cloutier, Hall, Wakefield, & Bailit, 2005). However, there have been problems with getting physicians to adhere to recommended guidelines. Providers cite lack of time and self-efficacy, as well as problems with prescribing medications and assessing asthma control (Gupta & Weiss, 2009). Therefore, possible redesign of the way asthma care is delivered and implementation of key asthma guidelines in schools, such as implementing school-based bundled interventions by an NP utilizing NAEPP guidelines, could improve guideline adherence and asthma control in children (Gupta & Weiss, 2009).

Quality Improvement Initiative

In 2000, Perry and Toole explored school-based asthma care and identified the need for innovative strategies to address asthma in high-poverty CPS schools to achieve optimal asthma outcomes (Perry & Toole, 2000). In response, a community asthma quality improvement initiative formed and demonstrated dramatic improvement in children with asthma attending Cincinnati public schools having school-based health centers (SBHCs) (Guo et al., 2005; Mansour et al., 2008). The initiative gathered health professionals from CCHMC, Neighborhood Health Care, Inc. (local federally qualified community health center), four school-based health centers in CPS, and the Cincinnati Health Department, as well as parents of children with asthma from the four schools, to determine which interventions would help improve the health of children with asthma attending those schools (Mansour et al., 2008). Data from this initiative supported a decreasing trend for the percentage of children reporting minimal activity restriction due to asthma and a statistically significant difference in ED visits for asthma for these children (Mansour et al., 2008). There were also improvements in the percentage of children with 1) asthma severity classified, 2) persistent asthma with controller medication prescribed, and 3) written AAPs.

This initiative coined the term perfect asthma care, defined as the percentage of students with asthma severity classified, percentage of students with persistent asthma having appropriate controller medication prescribed, and percentage of students with a written AAP on file (Mansour et al., 2008). Others have also described the significance of these outcomes for children with asthma (McLaughlin et al., 2006; Tinkelman & Schwartz, 2004).

Spreading Perfect Care

Several members of the original asthma quality improvement initiative decided to spread the improvement work of the asthma initiative to other schools with and without SBHCs based on NAEPP guidelines. They formed a new asthma improvement collaborative with school nurses, nurse practitioners, and physicians from CCHMC, the Cincinnati Health Department, and several federally qualified community health centers to improve asthma control in eight schools. Other asthma collaboratives in the U.S., with representatives from hospitals, schools, and community partners, have been effective in addressing asthma barriers, especially
in poor urban areas (Byrne, Schreiber, & Nguyen, 2006; Cicuttio et al., 2006; Clark et al., 2009; Goel et al., 2006; Mangione-Smith et al., 2005; Splett et al., 2006; Wheeler et al., 2006).

At the heart of this initiative is the nurse practitioner. Having an NP from a community asthma collaborative provide asthma care at school offers an alternative to school-based asthma education programs and a unique way to provide asthma care for children attending schools without school-based health centers. In this project, NPs at schools with SBHCs will continue to evaluate the children with asthma throughout the school year at the SBHC. The schools in the project are inner-city, predominately African-American, with an overall poverty level over 80%.

To track progress, the collaborative will obtain approval for this project from the Internal Review Board of CPS. Informed consent will also be obtained from all parents, as well as assent from all participating school-aged children. The asthma collaborative, as well as physicians from CCHMC and CHD, will provide guidance and assist with planning.

**PICO Question**

When implementing evidence-based practice (EBP), Fineout-Overholt, Melnyk, and Schultz (2005) recommend starting with a PICO question to organize clinical care. In the PICO format, P represents the patient population, I is the intervention, C is the comparison group, and O is the outcome. Formulating a searchable, answerable question drives the entire EBP process, from searching for the best evidence to evaluating achieved outcomes (Fineout-Overholt et al., 2005). For this project, the PICO question “Do school-aged children that receive an annual asthma assessment at school from a nurse practitioner (NP) providing bundled asthma interventions demonstrate fewer asthma exacerbations at school and fewer asthma-related ED visits?” establishes the EBP framework. The patient population for this project is school-aged children in a high-poverty elementary school. The interventions for this PICO question are bundled, school-based asthma interventions. The comparison group is students with asthma attending another elementary school with similar poverty but with no bundled, school-based asthma interventions. The outcomes for the intervention group are fewer asthma exacerbations at school and fewer asthma-related ED visits.

**Bundled Intervention Plan**

In this project, the interventions have been bundled, defined by the Institute for Healthcare Improvement (IHI) as four to five evidence-based interventions combined or “bundled” to help health care providers deliver the best possible care for patients safely and effectively (IHI, 2006). A bundle also provides a structured way to significantly improve patient outcomes. The specific bundled interventions for this project are an annual NP assessment at school using the Asthma Control Test™ (ACT) to classify asthma control, prescribing controller medications if indicated, and developing a written AAP. If the child has a medical home but continues to have poor symptom control, the NP and school nurse will coordinate care with the primary care provider to prevent confusion.

The school nurse plays a critical role in identifying and referring children who are not yet diagnosed with asthma (Baker, Friedman, & Schmitt, 2002). Some studies have shown, however, that it is not worthwhile to spend valuable resources in school-wide asthma screening or with follow up of children having less asthma morbidity (Wheeler et al., 2006). Due to limited resources, therefore, school nurses in selected high-poverty schools will identify children with persistent asthma not receiving regular care or those currently experiencing asthma symptoms through a health history completed by the parent, during student encounters in the health office, by reviewing medication logs, by teacher report of in-class symptoms or history of inhaler use, and/or through self-report. The nurse will also obtain parental consent for treatment.

**Asthma Evaluation Visit**

An NP from the asthma collaborative will schedule an in-school asthma evaluation visit in the school nurse office at a convenient time on all identified students and complete a thorough assessment utilizing an asthma encounter form developed by the asthma collaborative. Teachers will need to approve the appointment time so the child does not miss valuable class time. The NP will evaluate the child’s asthma severity and control using the ACT for children 12 years of age and over, and the Childhood ACT™ (C- ACT™) for children under 12 years of age (Schatz et al., 2006). The ACT is widely used to evaluate asthma control in children and adolescents (Lemanske et al., 2010; Liu et al., 2008, 2010; Schatz et al., 2006). Nathan et al. (2004) found a stronger correlation between the ACT score and a specialist’s evaluation of asthma control than between the forced expiratory volume (FEV1) and the specialist’s evaluation of asthma control for 407 patients with asthma.

Using the ACT, the provider scores the responses from the child and/or parent, and any score of 19 or under may indicate poor asthma control, and the child may need a daily controller medication. The NP will document the child’s asthma severity based on the NAEP guidelines that classify asthma using a step-wise approach for treatment as shown in Table 1 (AHRQ, 2008; NHLBI, 2007). The NP or school nurse will enter the student’s asthma data into the CPS electronic asthma database for tracking and reporting purposes, and for better communication with the PCP or asthma specialist.

**Asthma Treatment**

Evidence shows that the degree of inflammation in asthma directly correlates with the severity of the disease (van Aalderen, Sprikkelman, & Hoekstra, 1999) and the need for controller medication. Because asthma symptoms are believed to result from chronic inflammation in the airways, inhaled corticosteroids (ICSs) are the most potent and effective medication for persistent asthma (AHRQ, 2008). Using the step-up approach, children who are not well controlled on a low-dose ICS alone may need a higher dose of ICS, a combination medication containing an ICS and a long-acting beta-agonist (LABA), or a leukotriene receptor antagonist (LTRA) in combination with a low dose ICS (National Institutes of Health [NIH], 2010).

Both LABA and LTRA medications are used to help control moderate to severe asthma (NHLBI, 2007). However, Lemanske et al. (2010) found that although children vary in their response to different medications in step-up therapy, with some responding best to LTRA or higher doses of ICS, adding a LABA was significantly more likely to produce the best outcome overall. African-American study participants, however, were equally likely to respond to LABA step-up or ICS step-up and least likely to respond best to LTRA step-up (Lemanske et al., 2010). Although ICS agents are the gold standard as con-
troller agents for persistent asthma, some experts are questioning whether new treatment approaches need to be developed to cover neutrophilic inflammation (Martinez, 2009).

Whatever asthma medication the child receives, close provider follow up is warranted to evaluate medication efficacy and safety (Lemanske et al., 2010). If the child is not responding, the provider must decide what step to take next – increase the ICS dosage, add a LTRA, or change the treatment to a ICS/LABA combination (Lemanske et al., 2010; Von Mutius, & Drazen, 2010). The NP will evaluate the children at school at regular intervals depending on control. If children are having asthma symptoms on controller medications before their appointment, the school nurse will refer the child to the NP sooner.

School nurses in the collaborative, like others in the U.S., have stated that children attending higher poverty, inner-city schools do not have rescue inhalers for both home and school (Forbis et al., 2006). Therefore, every identified child will also get a prescription for a short-acting beta-agonist (rescue inhaler) for school. The NP will also provide a medication consent signed by the parent and the NP to allow the use of the rescue inhaler in school. Together, the parent, school nurse, and NP will determine if the child will carry the rescue inhaler or the school nurse will keep it in the office. In Ohio, students can carry their own inhaler if the parent and provider verify that the child is capable to self-administer (Amended Substitute Ohio House Bill 121, 1999). Flower and Saewyc (2005) assessed the capability of children to self-carry an inhaler and found that children under 12 years of age, as well as some children older than 12 years, almost always need supervision.

### Asthma Action Plan

If the child does not have an AAP on file, the NP will also develop an individualized, written AAP with the parent and the medical home if one exists. The AAP directs management of asthma at school and home, especially during exacerbation and in an emergency, and has demonstrated improved asthma outcomes for children (Braganza & Sharif, 2010; de Asis & Greene, 2004; Dinakar, Van Osdol, & Wible, 2004; Finkelstein, Lozano, Farber, Miroshnik, & Lieu 2002; Frankowski et al., 2006; Polisena, Tam, Laporte, Coyte, & Ungar, 2007; Stingone & Claudio, 2009; Toelle & Ram, 2002; Zemek, Bhogal, & Ducharme, 2008). McMullen et al. (2007) found that the AAP was one of the less frequently covered areas in asthma management and education, but others have found AAPS improve communication between the provider, family, and school (Erikson et al., 2006; Polisena et al., 2007). Although clear evidence exists that AAPS improve asthma outcomes, one Cochrane Review stated that the trials were small, the results were few and inconsistent, and no firm conclusion as to benefits of AAPS in producing reported outcomes could be made (Toelle & Ram, 2002). Borgmeyer, Jamerson, Gyr, Westhus, and Glynn (2005) administered a questionnaire to school nurses in St. Louis and found that although only approximately 28% of students with asthma had AAPS, when AAPS were present, they increased the nurse’s confidence in managing asthma exacerbations and provided specific guidance for providing care. Early recognition and treatment of an acute asthma exacerbation may prevent an ED visit (Velsor-Friedrich & Foley, 2001).

The AAP in this project is based on a traffic light with green, yellow, and red zones, and is a compilation of multiple AAPS found in the literature and used by providers locally (refer to Pediatric Nursing Web site for a link to the AAPS: www.pediatricnursing.net/). Even though many AAPS are based on peak flow readings, which have been shown to improve asthma outcomes (Burkhart, Rayens, Revelette, & Ohlmann, 2007; Pulcini, DeSisto, & McIntyre, 2007), school nurses in the asthma collaborative reported that most children do not have a peak flow meter, and consistency with the treatment regime at home and at school is important.

After the asthma assessment, the school nurse or NP will schedule a meeting with the parent to get the medication consent signed and to educate the parent on the AAP, including the meaning of each color zone and the interventions to take in each zone to achieve good asthma control, especially the red zone. The

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**Source:** National Heart, Lung & Blood Institute, 2007.

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### Table 1.

**NAEPP Stepwise Approach to Asthma Management in Children 5 to 12 Years of Age**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
<th>Step 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermittent asthma</td>
<td>Persistent asthma</td>
<td>Low-dose inhaled corticosteroid (ICS).</td>
<td>Low-dose ICS + long-acting beta agonist (LABA) or leukotriene (LTRA)</td>
<td>Medium-dose ICS + LABA</td>
<td>High-dose ICS + LABA</td>
</tr>
<tr>
<td><strong>Preferred Treatment</strong></td>
<td><strong>Low-dose inhaled corticosteroid (ICS).</strong></td>
<td><strong>Low-dose ICS + long-acting beta agonist (LABA) or leukotriene (LTRA)</strong></td>
<td><strong>Medium-dose ICS + LABA</strong></td>
<td><strong>High-dose ICS + LABA</strong></td>
<td><strong>High-dose ICS + LABA</strong></td>
</tr>
<tr>
<td>Short-acting beta agonist (SABA) as needed</td>
<td>Cromolyn or LTRA or theophylline or nedocromil.</td>
<td>Medium-dose ICS</td>
<td>Medium-dose ICS + LTRA or theophylline</td>
<td>High-dose ICS + LTRA or theophylline</td>
<td>High-dose ICS + LTRA or theophylline + oral corticosteroids</td>
</tr>
<tr>
<td>Alternate Treatment</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Add Patient Education and Environmental Control at each step. For Steps 2 to 4 consider allergic immunotherapy for patients with persistent, allergic asthma.</td>
<td></td>
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</tr>
<tr>
<td>Quick Relief</td>
<td>Use SABA as need for symptoms. Can have up to 3 treatments 20 minutes apart. May need one course oral corticosteroids depending on severity of symptoms/exacerbation. If use SABA more than 2 times per week for symptom relief, excluding exercise-induced asthma or acute illness, may need to move up step treatment.</td>
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</table>
green zone indicates the child is doing well with no coughing, wheezing, or breathing problems; can sleep all night without interruption from symptoms; and can play without activity restrictions. No specific intervention is needed in the green zone other than taking regularly prescribed controller medication and using a SABA inhaler if needed for infrequent symptoms. In the yellow zone, the child is symptomatic and having some trouble breathing with coughing, wheezing, or chest tightness; wakes up at night due to asthma symptoms; and has some activity restrictions. The child may be having an acute exacerbation or an acute respiratory infection causing asthma symptoms. Instructions are listed for using the rescue inhaler, possibly increasing the controller medication(s), and contacting the asthma provider. The red zone is more serious, with the child experiencing difficulty breathing, talking, and/or walking. There are signs of respiratory distress, such as retractions, nasal flaring, and possibly cyanosis. In the red zone, medication may or may not help symptom progression. If the rescue inhaler does not help the child move out of the red zone, the child needs immediate medical attention at the primary care provider’s office or the ED. The zones are general guidelines that need to be individualized on the AAP for each child. The NP will give the family a number to call if they do not have a PCP or asthma specialist.

The process outcomes tracked will be the percentage of students with identified asthma diagnosis and severity classification, percentage of students with persistent asthma with prescribed controller medication, percentage of students with a written AAP, and percentage of students having both a rescue bronchodilator and medication consent on file.

Discussion

Children with diagnosed asthma need to be under the regular care of a PCP or asthma specialist. For minority, inner-city children living in poverty, this is not happening regularly (Frederico & Liu, 2003; Mansour et al., 2008). For these children, in the absence of a SBHC, an NP coming to the school to provide a thorough evaluation of the child’s asthma severity and control, as well as prescribing appropriate medications, is a practical and cost-effective way to deliver care. Achieving and maintaining asthma control requires individualized attention, including assessment, education, remediation of asthma triggers and co-morbid conditions, and prescribing appropriate asthma medications (Rance, 2008). Although all components are essential according to national guidelines, the child adhering to an appropriate asthma medication regime is most effective in helping the child maintain good asthma control (NHLBI, 2007).

The school nurse working with a community or hospital-based NP to case manage the child’s asthma can play a critical role in asthma control and help the school become asthma friendly (Jones, Wheeler, Smith, & McManus, 2009). School-based interventions that provide comprehensive assessment, appropriate medications, and nursing case management may be more effective than school-based asthma education programs (Bartholomew et al., 2006; Wheeler et al., 2006). Nursing case management has demonstrated improved asthma control in children (Taras, Wright, Brennan, Campana, & Lofgren, 2004) and cost savings for adult patients with asthma (Greindler, Loane, & Parks, 1999).

Call to Action

Heinrich (2008) asserts one should end with a call to action. For asthma, all pediatric nurses need to increase their awareness of asthma prevalence in childhood and the impact on children’s quality of life, as well as the cost burden associated with ED visits and hospitalizations. Further, all pediatric nurses can help reinforce adherence to prescribed asthma medication to promote good asthma control in their own patient population. Regardless of whether asthma care is provided at school, a health center, a physician’s office, the ED, or inpatient, appropriate management of the child with asthma is imperative to prevent serious complications and even death (Velsor-Friedrich & Foley, 2001).

References


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Moo, C., Uvedal, S., Cuervas, Y., & Villanueva, R. (2010). Los Angeles Unified School District’s comprehensive asthma program: Results show decreased asthma symptoms and missed school days among students with asthma. NASN School Nurse, 25, 210-212. doi:10.1177/1942602X10374344

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