



Medicating Young or Very Young Patients — Part III

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In Part I of this series, the unique considerations about medicating children at different ages were addressed. In Part II, examples of medications used to treat common short-term illnesses in younger patients were examined. In this part, examples of medications used to treat children with two long-term conditions, asthma and attention-deficit/hyperactivity disorder, are identified. Action, contraindications, and safety concerns for these agents are addressed. The challenges and lifestyle changes that these chronic problems pose for children and their parents are also discussed.

Both of the chronic health problems discussed below: asthma and attention-deficit/hyperactivity disorder affect millions of children. The incidence of diagnosed childhood asthma has more than doubled in the last 2 decades; with more than 9 million American children currently diagnosed with asthma (American Academy of Allergy, Asthma and Immunology [AAAAI], 2006). Children diagnosed with attention-deficit/hyperactivity disorder (ADHD) number more than 4.4 million today, and 2.5 million of those are currently receiving medication for the disorder (Centers for Disease Control and Prevention, 2005).

In addition to the large numbers of children affected by these problems there are several other commonalities: Managing each of these health concerns involves the entire family, impacts the children's future adult health, and impacts the school life and social interactions of the involved children. Moreover, the general public seldom has a good understanding of the impact of these chronic health problems on either the child or the family. Nurses, in any healthcare environment, who have a basic understanding of the challenges, the medications, and some approaches to therapy related to asthma and ADHD can help to educate, support, and relieve some of the related uncertainty.

The first part of the discussion below focuses on childhood asthma and selected medications. In the second section, the challenges of having a child diagnosed with ADHD are addressed, and some current medication therapy is identified.

Childhood Asthma

Asthma is the most common chronic disease of childhood. It accounts for almost 13 million missed school

days annually, 2 million emergency room visits, more than 12 million physician office visits, and an estimated financial impact of more than 21 billion dollars in direct and indirect costs (AAAAI, 2006). The major symptoms of asthma may include any of the following or all of the following: cough, wheeze, dyspnea, and chest pain. (See Table 1.) Generally the diagnosis of asthma is established by a history of repeated instances of any of these symptoms. Frequently, there is a corresponding family history of asthma; approximately 40% of children who have parents with asthma will develop asthma (AAAAI, 2006)

The physiological process of asthma involves an overall increase in hypersensitive responsiveness to allergens, irritants, and respiratory infections. Everyone's airways constrict somewhat in response to irritating triggers. However, in people with asthma the airways are hyperreactive; for example, asthma causes an overreaction to triggers that would usually be just minor irritants to people without asthma. This increased responsiveness to irritation initially causes inflammation of the bronchial airways, bronchoconstriction, excess mucous secretion, tissue edema, airway lining damage, and bronchial hyperresponsiveness. These may respond and reverse with appropriate therapy. However, with repeated cycles of exacerbations and remissions, many of the changes in the asthmatic airways become irreversible and result in smooth muscle hypertrophy, mucous gland hypertrophy, mucous hyperproduction, and airway wall thickening. When uncontrolled, these processes lead to impairment and irreversible effects on lung growth and development (Gelfand, 2007). Nocturnal asthma is very common, with reactions occurring more frequently at night (between bedtime and rising). In fact, one of the earliest signs of asthma in small children is a nighttime cough or coughing after bouts of crying or exercise.

Common precipitants for asthma include exercise—especially prolonged or strenuous exercise in cold weather, the allergy season, or during an illness such as a cold; viral infections in upper respiratory tract exacerbates asthma. Asthmatic response may last weeks after viral infection is resolved; sinusitis/rhinitis—postnasal

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TABLE 1. LOOK AND LISTEN—SUGGESTIONS FOR PARENTS**Signs and Symptoms of Possible Asthma in Children**

- Anxious or scared look
- Cough, especially at night
- Unusual paleness or sweating
- Flared nostrils when child attempt to get some air
- Pursed lip breathing, fast or rapid breathing
- Hunched over posture: Cannot seem to stand up straight
- Restlessness during sleep
- Unexplained fatigue
- Vomiting
- Spaces between the ribs (may sink in when the child breaths)
- Coughing when child has no cold
- Clearing the throat a lot
- Irregular breathing
- Wheezing—however light
- Noisy, difficult breathing
- Squeaking noises when you put your ear to the child's back with your hand on chest

Note. If there are no sounds and the child is having symptoms, this is an emergency. Adapted from American Lung Association (2006a).

drip—lowers airway function and can worsen asthma; allergies—pollen, mold, animal dander (occasionally food); irritants—tobacco smoke, air pollution, strong odors, aerosol sprays, chemical fumes; pharmacological triggers—aspirin and other nonsteroidal anti-inflammatory medications, beta blockers, and sulfites; weather—breathing cold air can trigger an asthma attack, wet weather that may increase cold concentration, or windy weather that scatters more pollens in the air; emotions—crying, laughing, or yelling that involves deep rapid breathing or emotional situations of fear, stress, anxiety, or frustration can trigger asthma. In addition, the anxiety and panic that accompanies an asthmatic episode produces hyperventilation, which further exacerbates the asthma (American Lung Association, 2006b; Kemp & Kemp, 2001). Some children react to many of these triggers, and others react to only a few. Some may react only when multiple triggers are present, and some may react to single precipitants. Reactions vary widely, and each child is individual and reacts at a different level of severity.

Identifying precipitants sometimes requires a complete allergy work-up by healthcare professionals, especially allergists. However, the parents play a major role in identifying what may trigger their child's asthma, and they are extremely important in reducing exposure to identified triggers. (Kemp & Kemp, 2001)

There are two somewhat similar protocol guidelines for treating childhood asthma. One set of guidelines comes from the National Asthma Education and Prevention Program (NAEPP; 2002) out of the National Heart, Lung, and Blood Institute. A second set of guidelines comes from the Global Initiative for Asthma (GINA; 2006). GINA was launched in 1993 in collaboration with the National Heart, Lung, and Blood Institute and the

World Health Organization to address the problems of asthma prevalence, morbidity, and mortality on a global basis.

Both sets of guidelines stress the importance of (a) establishing a good relationship between professional practitioner, patient, and family; (b) identifying and reducing exposure to risk factors; and (c) treatment and monitoring. The current GINA guidelines are based on recommendations for treatment according to overall control of symptoms: minimal or no chronic symptoms day or night, preventing severe life-threatening attacks, decreasing patient's baseline airway hyperactivity and preventing it from increasing, no limitations on activities (no school or work missed—normalization of activity within patient's lifestyle), normalization of patient's lung function, and minimal or no adverse effects from medications. The current NAEPP guidelines are based more on a stepwise approach to controlling the severity of symptoms. However, the medications recommended for treatment are essentially the same in both sets of guidelines: corticosteroids (beclomethasone, budesonide, flunisolide, fluticasone, mometasone, and prednisone) to reduce the inflammation and adrenergic receptor agonists (beta-agonists—albuterol, epinephrine, ephedrine, isoproterenol, albuterol, metaproterenol, salmeterol, and terbutaline) to reduce the bronchoconstriction. Leukotriene modifiers (montelukast, zafirlukast, and zileuton) also may be beneficial in preventing exacerbations due to viral causes. Medications are usually divided into two types—quick relief (rescue medication) used to reduce the immediate symptoms of an asthma attack and long-term medication used to control the frequency and severity of attacks. Parents need a complete understanding about the drugs their children are taking—the purpose of the drug, the possible side effects, and the proper way to administer the drug—especially how to use asthma inhalers or nebulizers. Even with older children who can usually manage their inhalers independently, parents need to be able to reinforce appropriate education for how to administer the medication appropriately (dry powder inhalers [DPI]; metered dose inhalers [MDI]; MDI with spacer, nebulizers, or diskus) and when to use the medication; noncompliance is often a problem with inhalers because oral medication is preferred.

Examples of antiasthma medications are discussed below, with action, cautions and adverse effects information (Katzung, 2004; Turkoski, Lance, & Bonfiglio, 2007).

CORTICOSTEROIDS

Corticosteroids (beclomethasone [QVAR], budesonide [Pulmicort], flunisolide [Aerobid], fluticasone [Flovent], and triamcinolone [Azmacort]) have been used to treat asthma since the 1950s. Their most important action is inhibition of the lymphocytic, eosinophilic, and mucosal inflammation. Generally oral or parenteral corticosteroids are reserved for rescue therapy. Inhalers are the usual nonemergency delivery method of the above listed examples; delivering the drug directly to the airway significantly reduces systemic absorption. Each of these agents has some individual characteristics and formulations; the following is general information for this class of asthma medication.

- **Warnings/Cautions:**
Systemic effects of corticosteroids are significant, however they are generally lessened with inhaled formulations. Adrenal crisis can occur in younger patients; particular caution must be used when transferring from systemic to inhaled products, with high doses over extended periods, and when discontinuing (may cause an increase in allergic symptoms).
May cause bronchospasm with wheezing after inhalation, requiring immediate fast-acting bronchodilator treatment.
Not to be used to treat acute bronchospasm.
May cause a reduction in growth velocity in pediatric patients—usually related to dose and duration of exposure.
Prolonged use may cause psychiatric disturbances, incidence of secondary infection, may limit response to vaccines (avoid exposure to chicken pox).
- **Examples of Possible Adverse Reactions:**
Central nervous system (CNS) (agitation, depression, dizziness, headache, mental disturbances), rash, growth-velocity reduction, hypothalamopituitary-adrenal function suppression, weight gain; irritated mouth, nose, hoarseness, loss of smell/taste, unpleasant smell/taste, nausea; cough, paradoxical bronchospasm, pharyngitis, sinusitis, wheezing
- **Examples of Available Formulations:**
Beclomethasone (QVAR)—Aerosol for oral inhalation
Budesonide (Pulmicort) suspension for nebulizer (Respules) for use in nebulizer Flunisolide (Aerobid)—aerosol for oral inhalation
Fluticasone (Flovent)—aerosol for oral inhalation
Triamcinolone (Azmacort)—aerosol for inhalation
- **Recommended Dose—Approved Age:**
Beclomethasone >5 years
Budesonide >12 months
Flunisolide >6 years
Fluticasone >4 years
Triamcinolone >6 years
Each agent is dosed differently
Guidelines for specific dosing according to age and according to severity of the disease
- **Administration:**
Each inhaler or nebulizer has specific directions
After any of these agents, rinse mouth thoroughly to reduce aftertaste and incidence of candidiasis.

BETA-2 SELECTIVE AGONISTS

Because nonselective beta-receptor agonists (epinephrine, ephedrine, isoproterenol, albuterol [Proventil], metaproterenol [Alupent], salmeterol [Seravent], terbutaline [Brethaire]) cause more cardiac stimulation, they are reserved for acute exacerbation emergencies. Beta-2 agonists relax airway smooth muscle and inhibit some bronchoconstricting substances from mast cells. The long-acting inhaled beta-2 agonists (salmeterol, formoterol) have duration of bronchodilation of at least 12 hr. They are not to be used for acute exacerbations.

Usually used as an adjunct to anti-inflammatory medications to provide long-term control and to prevent exercise-induced symptoms. Each of the beta-2 selective agents is highly individual; the following is general information for this class of asthma medication.

- **Warnings/Cautions:**
Long-acting agents (salmeterol, formoterol) are not indicated to relieve acute asthma symptoms or for those who are successfully maintained with occasional use of beta-2 agonists. Both have been associated with an increased risk of asthma exacerbations and asthma related deaths.
Paroxysmal bronchospasm (which can be fatal) has been reported with inhaled beta-2 agonists.
Beta-2 agonists should be used with caution in the presence of cardiovascular disorders, convulsive disorders, thyrotoxicosis, or known sensitivity to the effects of sympathomimetics.
- **Examples of Possible Adverse Reactions:**
Extension of beta-receptor stimulation: tachycardia, palpitations, hyper/hypotension; dizziness, headache, nervousness, insomnia, hyperactivity; rash, hyperglycemia, hypokalemia, metabolic acidosis, skeletal tremors or muscle cramps; cough bronchitis, paradoxical bronchospasm, respiratory arrest
- **Examples of Available Formulations:**
Albuterol—aerosol (MDI), nebulizer, oral tablets, sustained release tablets
Formoterol—powder for oral inhalation (Foradil Aerolizer)
Metaproterenol—solution for nebulizer, oral syrup and tablets
Salmeterol—powder for oral inhalation
Terbutaline—powder for nebulizer, oral tablet
- **Recommended Dose—Approved Age:**
Albuterol >2 years
Fluticasone >4 years
Formoterol >4 years
Metaproterenol >12 months
Salmeterol >4 years
Terbutaline >12 years
Each agent is dosed differently. Guidelines for specific dosing are according to age and according to severity of the disease.
- **Administration:**
Each formulation has specific directions.
- **Combination:**
Fluticasone and Salmeterol (Advair diskus, Advair HFA aerosol)
Combination of corticosteroid and beta-2 agonist
Approved for maintenance treatment of asthma in children >4 years
Has cautions and adverse effects of both agents

LEUKOTRIENE MODIFIERS

These drugs act to inhibit the effects of leukotrienes in the inflammation process. They represent the first new treatment for asthma in over 2 decades. They are useful against exercise and allergen-induced bronchoconstriction, when used alone or in conjunction with maintenance inhaled corticosteroids.

- **Warnings/Cautions:**
Not for use in reversal of acute asthmatic attacks
Zileuton—hepatic adverse effects have been reported
- **Examples of Possible Adverse Effects:**
Headache, dizziness, insomnia, nervousness, nausea, abdominal pain, myalgia, arthralgia, rash
- **Examples of Available Formulations:**
Montelukast—tablets, chewable tablets, oral granules
Zafirlukast—tablets
Zileuton—tablets
- **Recommended Dose—Approved Age (All taken in the evening):**
Montelukast—6–23 months: 4-mg granules Q.D. (i.e., every day); 2–5 years: 4-mg chewable tab Q.D.; 6–14 years: 5-mg. chewable tablet Q.D.; >15 years: 10-mg tablet Q.D.
Zafirlukast—5–10 years: 10-mg tablet 2 times/day; >12 years: 20-mg tablet 2 times/day
Zileuton—>12 years: 600-mg tablet 4 times/day

ADHD in Children

Today, ADHD is the most commonly diagnosed neuro-behavioral disorder affecting school age children (American Academy of Pediatrics, 2000). However, despite a major increase in professional and public attention to ADHD over the last few decades, the prevalence rates are still highly variable depending on who is making the diagnosis (e.g., parents, mental health professionals, general medical practitioners) and on what basis the diagnosis is made (e.g., clinician observation, family reports, education specialists) (Centers for Disease Control and Prevention, 2005). There are some professionals who question whether ADHD is a disease, a neurobiological condition, or a set of symptoms (inattention, impulsivity, and overactivity that overlaps with other mental health conditions; Furman, 2005). This consideration is based on the fact that there is at this time, no specific etiology for ADHD and no validated screening tools or diagnostic criteria.

Despite the questions that remain in both the public and professional literature about whether or not ADHD is a specific disease, children are being diagnosed with ADHD and guidelines for identifying ADHD in children between 6 and 12 years of age are available (American Academy of Pediatrics, 2000; National Institute of Medicine, 1996). There are also treatment guidelines for children aged 6–12 years who are diagnosed with ADHD (American Academy of Pediatrics, 2001).

Current diagnostic criteria for ADHD identify three subgroups in this diagnosis; those children who predominantly exhibit hyperactive impulsivity and do not show significant inattention (ADHD-HI), those who predominantly show inattention and who do not exhibit significant hyperactive impulsivity (ADHD-I), and those with pervasive inattention, hyperactivity, and impulsivity (ADHD-C). Children with significant inattentive behavior often seem to be in another world, sidetracked by what is going on around them, failing to pay attention to details, rarely following instructions carefully, and skipping from one uncompleted task to another. Hyper-

active children cannot sit still (squirming or fidgeting); walk, run, or climb around when others are seated; talk when others are talking. Children with impulsivity act quickly without thinking and without regard for consequences, display emotions without restraint, and seem unable to engage in activities that take more time or effort (National Institute of Mental Health, 1996).

Each and every one of these indicative behaviors is perfectly normal at some times for most children. Moreover, children mature at different rates, and different parents may have high expectations for behavior or high acceptance of various behaviors. Many of the behaviors do not become problematic until a child enters the (usually) more regimented social environment of school, and, like parents, some teachers may have high expectations for behavior and some may have high acceptance of various behaviors. Therefore, a diagnosis of ADHD must be made by a qualified clinician who considers both the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994) diagnostic criteria and other critical questions about general health and home and school environment (see Table 2). Because behavioral symptoms suggestive of ADHD may not be apparent in a structured clinical setting, information from parents, caregivers, and teachers is a vital component for the professional seeking to obtain an accurate picture of the child's behavior.

As Furman (2005) and others have argued, there is no clear evidence about a specific causative factor for ADHD. Some evidence suggests the ADHD is a neurobiological condition that is strongly influenced by genetic factors (Faraone, 2006). Environmental (home, school, social) factors currently are not considered a primary causative factor. Some professionals, like Faraone (2006), have suggested that environmental factors may lead to ADHD only in genetically susceptible people. The interaction between genetic, biological, and environmental risk factors is highly complex and may vary greatly from child to child.

No single approach to treatment is effective for all children exhibiting the symptoms of ADHD. Some children respond very well to medication alone, and others respond well to behavioral therapy. However, research has indicated that a two-pronged approach—medication and behavioral treatment—is often more effective than either approach alone, especially if ADHD is accompanied by depression or anxiety (MTA Cooperative Group, 1999). Whatever treatment approach is chosen, the choice and implementation requires full parent (and child) participation and understanding in order to be as effective as possible.

Because of comorbidities, many children diagnosed with ADHD will need more than one medication. The examples discussed below are agents primarily used to treat children diagnosed with ADHD. Action, cautions, and adverse effects for these agents are identified (Katzung, 2004; Turkoski et al., 2007).

TREATING ADHD

Pharmacological treatment of ADHD has, for decades, consisted of stimulant drugs. These drugs do not cure ADHD—they are used to reduce the behavioral symp-

TABLE 2. EXAMPLES OF QUESTIONS ASKED WHEN CONSIDERING ADHD IN CHILDREN AGED 6–12 YEARS

- Has the symptomatic behavior (six or more of the symptoms) been present on a persistent basis for a >6 months to a degree that is inconsistent and maladaptive with the child's developmental level?
Inattention: Fails to give close attention to details, makes careless mistakes, has difficulty sustaining attention to activities (work or play), does not follow through on instructions, has difficulty organizing tasks/activities, avoids tasks that require sustained mental effort, loses items necessary for activities, is easily distracted by outside stimuli, is forgetful in daily activities
Hyperactivity: Fidgets (with hands or feet) or squirms in seat, leaves room in situations in which remaining there is expected, runs about and climbs excessively in situations in which it is inappropriate, has difficulty in quiet leisure activities, in motion as if driven by a motor, talks excessively
Impulsivity: Blurts out answers to questions without waiting for the question to be completed, has difficulty waiting turn, interrupts or intrudes on others
- Were some of these behavioral traits (symptoms) present before 7 years of age?
- Are some of these behaviors (symptoms) present in more than one setting (home, school, social)?
- Is there clear evidence that there is significant impairment in social or academic functioning?
- Do these symptoms occur exclusively during another developmental or psychotic disorder/mental disorder, such as bipolar, dissociative, anxiety, oppositional defiant, conduct, or personality disorder?
Activity variables: Does activity vary in response to touch, pressure, sound, lights, or other sensations? Does the activity increase when child is tired or hungry, and do symptoms abate when fatigue or hunger are addressed? Do activities increase in unfamiliar situations? What are caregivers' expectations of behavior? Are caregiver's expectations related to their own stress or emotional level? Are there significant differences between the caregiver's assessment of behavior and the educator's assessment of behaviors?
Family/environment variables: Is there strife, stress, disharmony, physical, mental or emotional abuse, alcohol abuse, divorce, job loss present? Have there been significant changes in child's life, such as death of sibling, parent, grandparent, pet, or other loved one? Has there been a change of residence or school? Is there conflict at school, such as bullying, undue or unexpected pressures?
General health considerations: Are senses intact? Is there hearing loss, vision difficulty, speech impediment? Are there medical disorders that may affect brain functioning? Is there a history of middle ear infections or intermittent hearing problems? Is child taking other medications? For what? Are there adverse effects of other medication child is taking?

Note. ADHD = attention-deficit/hyperactivity disorder. Adapted from the American Academy of Pediatrics (2000) and the American Psychiatric Association (1994).

toms that are associated with ADHD. Older drugs, known as psychotropic stimulants, resemble amphetamines. They act on the CNS to block the reuptake of dopamine and norepinephrine in the neuronal synapse, thus increasing the amounts of circulating dopamine and norepinephrine in the cerebral cortex.

One drug approved for treating ADHD in children that is not a stimulant is atomoxetine (Strattera). Atomoxetine acts to enhance norepinephrine activity by selectively inhibiting norepinephrine reuptake; it has little or no activity at other neuronal reuptake pumps or receptor sites.

PSYCHOTROPIC STIMULANTS

- Warnings/Cautions:
All of these agents carry a black box warning that sudden death and serious cardiovascular events have been reported with the use of CNS stimulants approved for attention-deficit/hyperactivity disorder in patients with pre-existing cardiac abnormalities or serious cardiac problems.
FDA mandates that a patient information guide be given to parents with original prescription and each refill.
Psychiatric adverse events may occur, stimulants may exacerbate symptoms of behavior disturbance and though disorder with preexisting psychosis and new-onset psychosis or mania may occur.

May be associated with aggressive behavior or hostility.

Not recommended for use in children <3 years of age.

Long-term effects in pediatric patients have not been determined.

Associated with growth suppression and appetite suppression.

- Examples of Possible Adverse Reactions:
Cardiovascular—hypertension, tachycardia, chest pain
CNS—insomnia, headache, nervousness, overstimulation, euphoria, exacerbation of tics, seizures, emotional lability, depression, anxiety, irritability, agitation, fever; dermatologic rash, urticaria
Endocrine and metabolic—growth suppression and weight loss
Gastrointestinal—anorexia, diarrhea, constipation, unpleasant taste, nausea, vomiting
Neuromuscular—tremor, asthenia
Ocular—blurred vision, mydriasis
- Drug/Drug Interactions:
Multiple: including decreasing effects of anti-hypertensives, sedative effects of antihistamines, and effects of adrenergic-blocking agents. Increasing effects of some analgesics and monoamine oxidase (MAO) inhibitors. Some antidepressants or anxiolytics may decrease effects of amphetamines.

- **Examples of Available Formulations:**
 Dextroamphetamine and amphetamine (Adderall)—tablets and extended-release (XR) capsules come in various combinations of both drugs.
 Dextroamphetamine (Dexidrine)—tablets and XR capsules
 Dexmethylphenidate (Focalin)—tablets and XR capsules
 Methylphenidate (Concerta)—XR tablets
 Methylphenidate (Metadate)—XR tablets and XR capsules
 Methylphenidate (Ritalin)—tablets, XR capsules, sustained-release tablets
 Methylphenidate (Methylin)—solution, tablets, chewable tablets
- **Recommended Dose—Approved Age:**
 Doses are different for each agent. All recommendations are specific for child's age group, and prescribers are cautioned about the need for frequent and consistent monitoring.
 Most are not approved for use in children <6 years of age.

ATOMOXETINE (STRATTERA)

Has no effect on dopamine.

- **Warnings/Cautions:**
 FDA mandates that a patient information guide be given to parents with original prescription and each refill.
 Black box warning that pediatric patients may be at increased risk of suicidal ideation, especially during initial few months and when changing dosage.
 Use caution with hepatic impairment and with patients who are poor metabolizers of cytochrome P450 2D6 (CYP2D6) metabolized drugs.
 Same cautions about CNS stimulation being associated with sudden death and increased cardiac events in patients with preexisting cardiac problems
 Same cautions about monitoring growth and weight
- **Examples of Possible Adverse Reactions:**
 Headache, insomnia, abdominal pain, nausea/vomiting, decreased appetite; increased blood pressure, tachycardia; menstruation disturbance, hot flashes; urinary retention; myalgia; sinusitis; increased diaphoresis
- **Drug/Drug Interactions:**
 MAO inhibitors may increase CNS toxicity; antidepressants may enhance adverse effects of atomoxetine; CYP2D6 inhibitors (e.g., chlorpromazine, delavirdine, fluoxetine, pergolide) may increase levels of atomoxetine.
- **Example of Available Formulation:**
 Capsules
- **Recommended Dose—Approved Age:**
 Children >70 kg: initial 0.5 mg/kg/day, increase after minimum of 3 days to 1.2 mg/kg/day (either as single dose or two evenly divided doses morn-

ing and late afternoon/early evening. Maximum dose 1.4 mg/kg or 100 mg, whichever is less

Medicating a child is often frightening for parents at any time. The medications prescribed to treat diagnosed ADHD have high potential for effectiveness and also have potential for serious adverse effects. Prescribers and other healthcare professionals who interact with these families can do much to overcome the fear and possible resistance by sharing clear information about these medications and honest information about the safety profile of the medication that is prescribed.

The diagnosis of ADHD is a family affair, and even with medication both child and family may realize improved benefits with therapy. Behavioral modification may help a child gain more control over behavior. Often the behavioral problems leave a child with low self-esteem and the parents with frustration and stress. Therapy as a family may help improve relationships and reinforce positive coping skills for child and family.

Conclusion

The road ahead for those with childhood asthma or ADHD and their families is often long; many children will carry their breathing problems and their behavioral problems into adulthood. Neither of these health problems just disappears because a child grows up. Informed, knowledgeable nurses in any practice setting who interact with these children and their families have the opportunity to be supportive, understanding, and provide accurate, up-to-date information and education. Helping families understand the mediations is important—when under stress and having to make decisions that they know will impact their child's future, parents may not hear or understand all the information they are given. Identifying local resources and support groups can be very helpful for some families; educating children and parents about Internet resources that are accurate and that they can trust is another aspect of education; and being open and accepting is vital. Parents often feel guilty about their child's health problems. In addition to being knowledgeable and efficient clinicians, nurses are caring—families with sick children need that.

REFERENCES

- American Academy of Allergy, Asthma and Immunology. (AAAAI) (2004). *Allergy and advocate* [Electronic version]. Retrieved June 20, 2007, from <http://www.aaaai.org/patients/advocate/2004/fall/costs.stm>
- American Academy of Pediatrics. (2000). Clinical practice guideline: Diagnosis and evaluation of the child with attention-deficit/hyperactivity disorder. *Pediatrics*, 105, 1158–1170.
- American Academy of Pediatrics. (2001). Clinical practice guidelines: Treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics*, 108, 1033–1044.
- American Lung Association. (2006a). *Childhood asthma overview. Early warning signals*. Retrieved July 10, 2007, from <http://www.lungusa.org/site>
- American Lung Association. (2006b). *Early warning signals: Asthma always gives a warning*. Retrieved July 10, 2007, from <http://www.lungusa.org/site>

- American Psychiatric Association. (1994). *Diagnostic and statistical manual for mental disorders* (4th ed.). Washington, DC: Author.
- Centers for Disease Control and Prevention. (2005). Mental health in the United States: Prevalence of diagnosis and medication treatment for attention-deficit/hyperactivity disorder—United States, 2003. *Morbidity and Mortality Weekly Report*, 54, 842–847.
- Faraone, S. (2006). *The genetics of attention-deficit/hyperactivity disorder: Current status and clinical implications*. Retrieved July 1, 2007, from <http://www.medscape.com/viewarticle/546469>
- Furman, L. (2005). What is attention-deficit hyperactivity disorder (ADHD)? *Journal of Child Neurology*, 20, 994–1002.
- Gelfand, E. (2007). *Controlling disease for optimal outcomes: New paradigms in pediatric asthma management*. Retrieved July 5, 2007, from <http://www.medscape.com/viewarticle/558216>
- Global Initiative for Asthma. (2006). *Pocket guide for asthma management and prevention in children*. Retrieved June 25, 2007, from <http://www.ginasthma.org>
- Katzung, B. (2004). *Basic and clinical pharmacology*. New York: McGraw-Hill.
- Kemp, J. P., & Kemp, J. A. (2001). Management of asthma in children. *American Family Physician*, 1, 1341–1348.
- MTA Cooperative Group. (1999). A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder (ADHD). *Archives of General Psychiatry*, 56, 1073–1086.
- National Asthma Education and Prevention Program. (2002). *Guidelines for the diagnosis and management of asthma: Expert Panel Report 2—Update on selected topics*. Retrieved June 29, 2007, from <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>
- National Institute of Mental Health. (1996). *Attention-deficit/hyperactivity disorder* (NIH Pub. No. 3572). Retrieved July 1, 2007, from <http://www.nimh.nih.gov/publicat/NIMHadhpub.pdf>
- Turkoski, B., Lance, B., & Bonfiglio, M. (2007). *Drug information handbook for advanced practice nursing* (8th ed.). Hudson, OH: Lexi Comp.

CALENDAR

National Offerings

May 17–21, 2008 – **NAON Annual Congress**, The NAON Network: Gateway to Excellence, McEnry Convention Center, San Jose, CA. For more information: www.orthonurse.org.

Chapter Offerings

October 2, 2007 – **“Beach, Bones, and Beyond 2007,”** Cocoa Beach, Florida. Presented by the NAON Central Florida Chapter. For more information: Laura Cornett, (321) 243-7775 or redwood625@cfl.rr.com.

October 4 & 5, 2007 – **Orthopaedics and Trauma in the Tetons**, St. John’s Medical Center, 625 E. Broadway, Wapiti & Moose Rooms. For more information: Diane Bircher, rdbircher@silverstar.com.

October 19, 2007 – **New Trends in Orthopaedics**, Wausau, Wisconsin. Presented by the Northopedics Chapter of NAON. For more information: Luann Theis, (715) 803-1349 or theis@ntc.edu.

October 20, 2007 – **“Nuts and Bolts of Orthopaedic Nursing,”** St. Luke’s Episcopal Hospital, 6720 Bertner Avenue, Houston, TX 77030. Presented by the Texas Gulf Coast Chapter. For more information: Doris Walker, (832) 355-4748 or dwalker@slch.com

October 25–26, 2007 – **Orthopaedic Nursing: New Concepts and Challenges**, Minneapolis Convention Center, Minneapolis, Minnesota. Presented by the Twin Cities Chapter 29 of NAON and Hennepin County Medical Center. For more information: Mary K. Wollan, (612) 873-2569 or mary.k.wollan@co.hennepin.mn.us.

October 29, 2007 – **Orthopaedic 2007: 5th Annual Conference**, Swedish Hospital, 747 Broadway, Seattle, WA 98122. Presented by Swedish Hospital’s Orthopaedic Departments. For more information: Molly Hemingson, (425) 883-0522 or mollyhemingson@hotmail.com

October 30, 2007 – **B.O.N.E.S Symposium**, 200 W. Arbor Dr. #8929, San Diego, CA 92103. Presented by the University of California, San Diego. For more information: Beverly Morris, (858) 772-8287 or bamorris@ucsd.edu.

January 19, 2008 – **“Bone Buffet”, 4th Annual Orthopaedic Seminar**, Ocala Hilton, Ocala, FL. Presented by Horse Capital Chapter #208 of NAON. For more information: Robert Lonadier at 352.401.1629 or robert.lonadier@hcahealthcare.com.

Additional Offerings

October 19, 2007 – **2nd Annual Orthopaedic Conference**, The Western Pennsylvania Hospital, Pittsburgh, PA. For more information: (412) 578-5288 or dritz@wpahs.org; (412) 688-7923 or lorthorn@aol.com