Attention-Deficit/Hyperactivity Disorder in Children and Adolescents: Closing Diagnostic, Communication, and Treatment Gaps

Amy Vierhile, RN, MS, CPNP, Adelaide Robb, MD, & Patricia Ryan-Krause, MS, MSN, RN, CPNP

ABSTRACT
Nurses and nurse practitioners often play a key role in the management of children with attention-deficit/hyperactivity disorder (ADHD), a disorder that often persists into adolescence and adulthood. The diagnosis of ADHD requires careful history taking, use of standardized rating scales, and close attention to the patient’s behavior and informants’ reports. Stimulants appear to be most effective for patients with this diagnosis, but pharmacotherapy for ADHD should be combined with educational and behavioral interventions and careful follow-up to optimize treatment outcomes. Nurses and nurse practitioners must advocate to assist patients and families achieve goals at home and at school.

Key words: Attention-deficit/hyperactivity disorder, ADHD, psychiatric comorbidities, screening, diagnosis.

OBJECTIVES
After reading this manuscript, the reader should be able to:
1. State key ADHD diagnostic criteria, differentiate between ADHD subtypes, and identify common comorbidities.
2. Explain the different aspects of ADHD in childhood and in adolescence.
3. Select appropriate medication and behavioral therapies for patients with ADHD.
4. Overcome patient and parental communication barriers that impede treatment adherence.
5. Understand the important roles to be played by pediatric nurse practitioners, school teachers and counselors, children/adolescents, and parents in the effective treatment of ADHD.

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Rev**ision (DSM-IV-TR),** the estimated overall prevalence of ADHD is 3% to 7% in school-aged children (American Psychiatric Association, 2000). Results from a representative cross-section of the U.S. population of 8- to 15-year-old children indicated that 8.7% met the DSM-IV criteria for a diagnosis of ADHD (Froehlich et al., 2007). The prevalence of ADHD in this sample was 11.8% for boys and 5.4% for girls and was not substantially less in older versus younger children. ADHD was found in 10.0% of subjects aged 8 to 11 years and in 7.5% of subjects aged 12 to 15 years (Froehlich et al.). The age at onset for ADHD is typically younger (Kessler, Berglund, et al., 2005), as noted by the DSM-IV-TR criterion for ADHD that specifies existence of some hyperactive-impulsive or inattentive symptoms that cause impairment prior to age 7 years (American Psychiatric Association). However, the condition persists into adulthood for the majority of boys and approximately one third of girls (Kessler, Adler, et al., 2005).

Although ADHD persists into adulthood for a large number of patients with this condition, symptoms change substantially with age (Table 1) (Armstrong & Nettleton, 2004; Harpin, 2005; Woodard, 2006). Behavioral disturbances (e.g., excessive motor restlessness, poor social skills) are common in younger children, and academic problems become apparent when school age is reached. In adolescence, behaviors such as delinquency, unsafe driving practices, and high risk of substance abuse emerge. ADHD results in a wide range of additional problems in adults, including occupational failure and relationship discord (Harpin; Woodard). It is important to note, however, that depending on the type of ADHD (i.e., inattentive, hyperactive-impulsive, or combined) and the presence of comorbid disorders, individual children with ADHD may differ considerably with regard to symptoms (Armstrong & Nettleton).

The high prevalence and often lifelong effects of ADHD result in significant economic impact. The authors of a recent meta-analysis evaluating the costs of ADHD related to health care, education, parental work loss, and juvenile justice across 13 studies estimated the annual cost of illness for ADHD at $14,576 per individual (2005 U.S. dollars). Using a prevalence rate of 5%, the estimated total annual societal cost of illness for ADHD in childhood and adolescence was $42.5 billion (Pelham, Foster, & Robb, 2007). Results of medical cost studies consistently indicate that both children and adults with ADHD have higher annual medical costs per individual compared with matched or unmatched controls (approximately $1500 higher for children and approximately $3000 higher for adults with ADHD) (Matza, Parme, & Prasad, 2005). In addition, a survey conducted in 500 patients with ADHD and 501 age-matched control subjects revealed that average household incomes were significantly lower among individuals with ADHD compared with control subjects, regardless of academic achievement or personal characteristics. Based on these findings, total loss of workforce productivity associated with ADHD was estimated to be between $67 billion and $116 billion (Biederman & Faraone, 2006).

Parents of children with ADHD experience increased levels of self-blame, social isolation, depression, and marital discord (Johnston & Mash, 2001). Parents of children with ADHD perceive their family structure as less supportive and more stressful than those of healthy children. Interpersonal relationships in ADHD families are negatively affected by feelings of resentment and antagonism because of the belief that the patient’s behavior is willful. Parents of children with ADHD are at higher risk for symptoms of depression as well as separation or divorce compared with parents of children without ADHD (American Psychiatric Association, 2000; Brown & Pacini, 1989). Employment status of parents also is negatively affected by having a child with ADHD (Matza et al., 2005; Noe & Hankin, 2001).

Prompt diagnosis and effective treatment of ADHD have the potential to decrease the impact of the disease. The remainder of this report considers the management of ADHD in the primary care setting.

**DIAGNOSIS OF ADHD**

The nurse practitioner plays an important role in the diagnosis of ADHD, which is based on the criteria set forth in the DSM-IV-TR (Box). Patients with ADHD are divided into three groups based on their symptoms: inattentive, hyperactive/impulsive, and combined type (American Psychiatric Association, 2000). Although many patients have symptoms of inattention and impulsivity/hyperactivity, in some individuals, one or the other pattern is predominant. Patients with predominantly inattentive subtype must have six or more symptoms of inattention with fewer than six symptoms of hyperactivity-impulsivity deemed as problematic; the reverse is true for patients with hyperactive-impulsive subtype. Patients with ADHD marked by inattention tend to exhibit the most pronounced academic deficits and school-related problems and are socially passive. Peer rejection and accidental injury are more common in those with predominantly hyperactive-impulsive subtype. Patients with the combined type exhibit six or more symptoms of inattention in addition to six or more symptoms of hyperactivity-impulsivity. The appropriate subtype is based on the predominant symptom pattern during the previous six months.
in children and adolescents with suspected ADHD, which is briefly summarized in this section (Pliszka, 2007).

Screening. The clinician should screen for ADHD as part of any well-child visit or mental health assessment. Screening for ADHD is accomplished by asking specific questions about the major symptoms of the condition (i.e., inattention, impulsivity, and hyperactivity) and determining whether such symptoms cause impairment (Pliszka, 2007). General open-ended questions can include questions about how school is going or whether the child takes advantage of any of the school’s support services. The health care provider also can use a screening instrument such as the Pediatric Symptom Checklist, which asks more specific questions (Jellinek et al., 1988). This screening tool is available as a parent checklist for evaluation of younger children or as a youth self-report checklist for evaluation of adolescents. It contains columns corresponding with the frequency (never, sometimes, or often) of specific ADHD symptoms, such as inability to sit still, lack of interest in school, excessive daydreaming, irritability, trouble concentrating, trouble sleeping, unnecessary risk taking, and refusal to share. Screening questions about inattentiveness as well as hyperactivity/impulsivity should be asked by the clinician regardless of the nature of the chief complaint prompting the patient’s visit (Pliszka).

Patient evaluation. Evaluation of the child or adolescent with possible ADHD has many facets. The patient’s history is a cornerstone in the diagnostic assessment. Therefore, the evaluation should include detailed interviews with both the child and parents related to ADHD symptoms. Feedback about symptoms in the school setting should be sought from the child’s teachers (Langberg et al., 2008; Nass, 2005; Pliszka, 2007). Interview questions should pertain to symptoms of inattention,

### Key Steps in Screening, Evaluation, and Diagnosis

The American Academy of Child and Adolescent Psychiatry and the American Academy of Pediatrics (AAP) have provided guidance for the evaluation of children and adolescents with suspected ADHD, which is briefly summarized in this section (Pliszka, 2007).

#### TABLE 1. Attention-deficit/hyperactivity disorder symptoms across the life span

<table>
<thead>
<tr>
<th>Developmental stage</th>
<th>Symptoms</th>
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<tbody>
<tr>
<td>Preschool</td>
<td>Excessive motor activity or mobility, low frustration tolerance, impulsivity, inability to sustain attention, distractibility, poorly organized behavior, aggressiveness, noncompliance, inappropriate or demanding behaviors, negative social behavior, less adaptive behaviors</td>
</tr>
<tr>
<td>School-aged</td>
<td>Symptoms similar to those in preschool-aged children, with the emergence of academic difficulties, rejection by peers, oppositional behavior, lying, stealing, poor self-esteem, poor sleep patterns</td>
</tr>
<tr>
<td>Adolescence</td>
<td>Inattention, impulsiveness, inner restlessness, continued academic difficulties, problems with authority, increased risky behavior (e.g., smoking, substance abuse, early sexual activity, driving accidents/traffic violations), excessively aggressive and antisocial behavior, overall feelings of worthlessness</td>
</tr>
<tr>
<td>Adulthood</td>
<td>Exacerbation of underlying psychiatric conditions, frequent job changes and job losses, marital discord, multiple marriages, problems with the law, substance abuse</td>
</tr>
</tbody>
</table>

Data from Armstrong & Nettleton, 2004; Harpin, 2005; Woodard, 2006.

Although the American Psychiatric Association has provided clear criteria for ADHD, this condition is greatly underdiagnosed and thus undertreated. Results from the National Health and Nutrition Examination Survey (NHANES) 2001-2004 indicated that only 47.9% of children and adolescents meeting the DSM-IV criteria for ADHD had received such a diagnosis before the survey. Moreover, only 32.0% of those who met diagnostic criteria for ADHD had received medication for it during the past year (Froehlich et al., 2007).

There are many barriers to the diagnosis of ADHD. For example, parents may not recognize that a child with behavioral problems has symptoms of hyperactivity. As a result, they may not seek help from their health care provider (Sayal, Goodman, & Ford, 2006). Children with symptoms of ADHD who are statistically underdiagnosed include Black children, those from families of low socioeconomic status, and female children (Bussing, Zima, Gary, & Garvan, 2003). The high rate of psychiatric comorbidity in children and adolescents with ADHD also may contribute to underdiagnosis of this condition. Substance abuse disorder, bipolar disorder, depression, and other mood and anxiety disorders may confound the diagnosis of ADHD in adolescents (Kessler et al., 2006). Comorbidity increases with age among patients with ADHD (Biederman et al., 2006; Harpin, 2005; Woodard, 2006), which may contribute to increased difficulties with the diagnosis of ADHD in adolescents and young adults. Patients with ADHD should be evaluated carefully to determine whether they exhibit any of the symptoms that meet the criteria for a separate comorbid disorder. When a patient with ADHD has another condition that meets the criteria for a second disorder, the treatment plan should include both the comorbidity and ADHD (Langberg, Froehlich, Loren, Margin, & Epstein, 2008; Pliszka, 2007).

#### Patient evaluation. Evaluation of the child or adolescent with possible ADHD has many facets. The patient’s history is a cornerstone in the diagnostic assessment. Therefore, the evaluation should include detailed interviews with both the child and parents related to ADHD symptoms. Feedback about symptoms in the school setting should be sought from the child’s teachers (Langberg et al., 2008; Nass, 2005; Pliszka, 2007). Interview questions should pertain to symptoms of inattention,
impulsivity, distractibility, and hyperactivity both at school and at home (Langberg et al., 2008; Pliszka, 2007). During the interview, the clinician also should perform a mental status examination, assessing appearance, sensorium, mood, affect, and thought processes that might suggest a psychiatric disorder other than ADHD (Pliszka). Interviews with young children can be conducted concurrently with parent interviews in most cases. However, older children and adolescents should be
interviewed separately from their parents because they may not reveal significant symptoms (e.g., depression, substance abuse) in the presence of their parents (Golderring & Cohen, 1988; Golderring & Rosen, 2004; Pliszka). One method of conducting an adolescent interview is use of the HEEADSS approach (Home, Education, Activities, Drugs, Sexuality, Suicide/depression) (Golderring & Cohen), which has been expanded to HEEADSSS, to include Eating and Safety from injury/violence (Golderring & Rosen). The questionnaire was designed to help practitioners encourage adolescents to answer tough questions in about 10 to 20 minutes (Golderring & Cohen; Golderring & Rosen). Beginning with general open-ended questions about home, school, and general activities helps to build the patient’s trust prior to asking questions related to drugs and sexuality. It is important to assure the adolescent that any information revealed is confidential and to make the patient feel comfortable. Asking non-threatening, open-ended questions without assumption as to what is the “normal” response is most effective for obtaining information from an adolescent (Golderring & Rosen).

The interview with the parents should address all previously mentioned symptoms of ADHD and the duration, frequency, severity, and age of onset for each symptom. Family history and functioning should be assessed because of the significant genetic component in the etiology of this condition (Faraone et al., 2005; Pliszka). If one person in a family is diagnosed with ADHD, there is a 25% to 35% probability that any other family member also has ADHD, compared with a 4% to 6% probability for someone in the general population (Attention Deficit Disorder Association, 1998). Across studies of ADHD in twins, the heritability of the condition was estimated to be 76% (Faraone et al., 2005).

The patient’s academic/intellectual progress should be reviewed with special attention to learning disorders because these often are present in children with ADHD. Parents of children with ADHD should complete one of the many standardized behavior rating scales that have well-established normative values for children (Langberg et al., 2008; Pliszka, 2007). It is important to note that information from parents may be influenced by attitudes or stigma associated with an ADHD diagnosis and the potential need for long-term therapy, social background, personal agendas, varying observational skills, and beliefs about the validity of questionnaires used to aid in diagnosis (Nass, 2005; To, 2005). Information from teachers should be considered in light of how well they know the child. Elementary school teachers, who spend the entire day with a child, are likely to provide more relevant information than a high school teacher, who sees the adolescent only for a short time each day (Nass).

The AAP has compiled a “tool kit” for the assessment and management of ADHD; this kit includes several recommended diagnostic tools for use in children with ADHD, including the National Initiative for Children’s Healthcare Quality (NICHQ) ADHD Primary Care Initial Evaluation Form, the NICHQ Vanderbilt Assessment Scale–Parent Informant, and the NICHQ Vanderbilt Assessment Scale–Teacher Informant (AAP, 2008). Table 2 summarizes four common behavior rating scales suitable for use in primary care and includes advantages and disadvantages of each (Collett, Ohan, & Myers, 2003; Woodard, 2006).

Because few medical conditions have symptoms similar to those of ADHD, laboratory testing and neurologic imaging generally are not recommended if the patient’s medical history is not remarkable (Langberg et al., 2008; Pliszka, 2007). Psychological and neuropsychological tests also are not necessary for many patients with ADHD. However, such tests should be performed if the patient’s history suggests low general cognitive ability or low achievement in language or mathematics relative to the patient’s overall intellectual ability. For example, if the parent and teacher report that the patient performs at or above grade level when given one-to-one supervision or participates in leisure activities (e.g., reading science fiction novels) requiring a skill that the patient lacks in the school environment, it is likely that treatment of the ADHD will begin to resolve achievement deficits. If academic performance does not show clear improvement in 1 to 2 months despite improvement in ADHD symptoms, then psychological testing for learning disorders is indicated (Pliszka).

**Diagnosis of ADHD in the preschool child.** Diagnosis of ADHD in the preschool child may be difficult. Common features of ADHD in this group include aggressiveness, noncompliance, inapropriate and demanding behaviors, a high level of negative social behavior, less adaptive behavior, poor cooperation, dislike by other children, and self-reported friendship difficulties. Preschool children with ADHD also are likely to have comorbid oppositional defiant disorder and language impairment (Armstrong & Nettleton, 2004). It is most important to remember that core symptoms of ADHD in preschool children are essentially the same as those in school-aged children and include higher levels of motor activity, low frustration tolerance impulsivity, inability to sustain attention, distractibility, and poorly organized behavior (Armstrong & Nettleton; Harpin, 2005; Woodard, 2006). However, it should be recognized that many conditions might result in symptoms that overlap with those of ADHD in
preschool children. These include a sudden change in the child’s life (e.g., the death of a parent or grandparent, parents’ divorce, or a parent suddenly becoming unemployed), undetected seizures, such as absence or temporal lobe seizures, a chronic middle ear effusion that causes intermittent hearing problems, medical disorders that may affect brain functioning, underachievement caused by learning disability, and anxiety or depression (National Institute of Mental Health, 2008). Differential diagnosis of ADHD and identification of comorbidities in preschool children with ADHD can be aided by use of specific diagnostic tools for mood and anxiety disorders, such as the Preschool Feelings Checklist (Luby, Heffelfinger, Koenig-McNaught, Brown, & Spitznagel, 2004).

### Improving diagnosis of ADHD in adolescents

Substantial literature exists indicating that

<table>
<thead>
<tr>
<th>Scale</th>
<th>Age range</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
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<tbody>
<tr>
<td><strong>Connors Rating Scale Revised (CRS-R)</strong></td>
<td>3-17 y</td>
<td>- Based on DSM-IV criteria&lt;br&gt;- Assesses wide variety of common behavior problems (e.g., sleep, eating, peer group problems)&lt;br&gt;- Revised scale updates age- and sex-normative data and factor structure&lt;br&gt;- Available in both short and long, parent, teacher, and self-report versions</td>
<td>- Large normative base&lt;br&gt;- Multiple observer forms&lt;br&gt;- Abbreviated forms aid in treatment monitoring&lt;br&gt;- French version</td>
<td>- Few items regarding comorbidities&lt;br&gt;- Somewhat redundant&lt;br&gt;- Complete version is lengthy</td>
</tr>
<tr>
<td><strong>Brown Attention Deficit Disorder Scale (BADDS) for Children and Adolescents</strong></td>
<td>3-12 y, parent and teacher; 8-12 y, self-report; 12-18 y, self-report</td>
<td>- Unlike other scales based on DSM-IV criteria, BADDS measures executive functioning associated with ADHD&lt;br&gt;- Also measures developmental impairments&lt;br&gt;- Separate rating scales for 3-7 y, 8-12 y, 12-18 y&lt;br&gt;- The scale should be administered in an interview format, especially the parent and youth self-report version</td>
<td>- Measures inattentive ADHD&lt;br&gt;- Only scale that accounts for inattentive behavior as a function of age&lt;br&gt;- Strong psychometrics</td>
<td>- Minimal data about use in clinical settings</td>
</tr>
<tr>
<td><strong>Vanderbilt ADHD Rating Scale</strong></td>
<td>6-12 y, parent and teacher forms</td>
<td>- Newer scale based on DSM-IV criteria&lt;br&gt;- Both parent and teacher form&lt;br&gt;- Similar to CRS-R and SNAP-IV&lt;br&gt;- Assesses for comorbidities and school functioning</td>
<td>- Screens for comorbidities (oppositional defiant disorder, anxiety, depression)&lt;br&gt;- Spanish and German versions&lt;br&gt;- Available online&lt;br&gt;- Psychometrically strong scales&lt;br&gt;- Scoring available online&lt;br&gt;- Same scale used for both parent and teacher&lt;br&gt;- Measures comorbidity</td>
<td>- Newer scales that lack sufficient data to establish their validity&lt;br&gt;- Normative data from only one U.S. region&lt;br&gt;- No self-report scales</td>
</tr>
<tr>
<td><strong>Swanson, Nolan, and Pelham IV (SNAP)</strong></td>
<td>5-11 y, parent and teacher rating scale</td>
<td>- One of the first scales based on DSM-IV criteria&lt;br&gt;- Frequently used in ADHD research</td>
<td>- Lack of published psychometrics and normative data&lt;br&gt;- Brief assessment of comorbidities</td>
<td></td>
</tr>
</tbody>
</table>

the diagnosis of ADHD in adolescents and young adults is more difficult than in younger children (Nahlik, 2004; Weiss & Murray, 2003). In addition to previously mentioned considerations of information obtained from high school versus elementary school teachers and the increased prevalence of psychiatric comorbidities, adolescents may be less forthcoming with information and less willing to cooperate with clinicians (Goldman & Cohen, 1988; Nahlik). Also, older adolescents may identify problems associated with ADHD (e.g., procrastination, lack of motivation, mood lability, and low self-esteem), rather than the core symptoms, as their primary concern (Nahlik; Weiss & Murray).

Close attention to a number of different factors and use of specific techniques can improve diagnosis of ADHD in adolescents. It is particularly important to be alert for symptoms of inattention, which are more likely to be present than motor restlessness in adolescents with ADHD (Hurtig et al., 2007; Nahlik, 2004; Wolraich et al., 2005). Careful use of input from informants also is important for accurate diagnosis of ADHD in adolescents. Establishing good rapport with the adolescent during the diagnostic process (e.g., through use of the HEADSS approach) is particularly important given the difficulty in gaining good cooperation from these patients (Nahlik). The high risk of comorbidity in adolescents with ADHD makes it particularly important to be attentive to signs of substance abuse, mood and/or anxiety disorders, and high-risk behaviors in these patients (Wolraich et al.).

Many traditional rating scales are based on experience with childhood ADHD and do not take into account relatively subtle symptoms first presenting in adolescence. However, some rating scales are appropriate for evaluation of adolescent patients. These scales include the Brown Attention-Deficit Disorder Scales, the Child Attention Profile, the Connors’ Parent Rating Scale, the DSM-IV-TR behavior checklists, the Attention Problems Scale–Teacher Report Form, the Behavior Assessment System for Children Parent Rating Scale, the Behavior Assessment System for Children Teacher Rating Scale, the Child Behavior Checklist, and the Connors-Wells Adolescent Self-Report Scale (Nahlik, 2004; Wolraich et al., 2005).

MEDICAL AND BEHAVIORAL THERAPIES FOR ADHD

Overall Treatment Recommendations

The AAP has provided overall guidelines for the management of children and adolescents with ADHD. These recommendations provide the following overall guidance for primary care providers (AAP, 2001):

- Establish a treatment program that recognizes ADHD as a chronic condition.
- In collaboration with the parents, child, and school personnel, specify appropriate target outcomes.
- Recommend stimulant medication and/or behavior therapy as appropriate to improve target outcomes.
- When the selected management has not met desired outcomes, evaluate the original diagnosis, use of all appropriate treatments, adherence to the treatment plan, and presence of coexisting conditions.
- Provide periodic systematic follow-up for the patient.

The treatment program for the child or adolescent with ADHD may include any of a large number of interventions, which are described in the following sections.

Nonpharmacologic Interventions

Many different nonpharmacologic interventions have been demonstrated to provide at least some benefit in patients with ADHD but generally are not sufficient to fully control symptoms in most patients. Special classrooms or summer camps with a consistent set of rewards and punishments have been used as part of therapy for patients with ADHD and can provide a highly supportive learning environment. However, the improvements observed with these approaches may be highly context-specific and impractical for use in other settings. These programs also often are very expensive (To, 2005).

Cognitive-behavioral therapy in which a therapist works directly with the patient to improve management of behavior has been used effectively in adults with ADHD, but achievement of self-management with this approach appears to be very difficult for most children and adolescents (Safren et al., 2005; To, 2005).

Clinical behavioral therapy currently is viewed as the best non-drug intervention for children and adolescents with ADHD. This approach differs from cognitive-behavioral therapy in that the therapist, rather than working directly with the patient, consults with parents and teachers and trains them how to consistently use rewards and shaping behaviors to change the home and learning environments for the child (Smith, Barkley, & Shapiro, 2006; To, 2005). Parents generally are involved in 10 to 20 sessions of 1 to 2 hours in which they are educated about the nature of ADHD, learn to attend more carefully to their child’s misbehavior and to when their child complies, establish a token reward system, use time out effectively, manage noncompliant behaviors in public settings, use a daily school report card, and anticipate future misconduct (Pliszka, 2007; Smith et al., 2006). Teachers are an integral part of these treatment programs; parents of children with ADHD should work closely with teachers to ensure that...
a similar behavior management system is implemented consistently in the school environment.

Parental ADHD may reduce the success of clinical behavioral programs (Sonuga-Barke, Daley, & Thompson, 2002), suggesting that treatment of an affected parent may be an important part of the child’s treatment. Other aspects of family dysfunction, such as parental depression, substance abuse, or marital problems also should be addressed to improve the chances of treatment success (Chronis, Chacko, Fabiano, Wymbs, & Pelham, 2004). Cognitive-behavioral depression treatment for mothers of children with ADHD has been shown to improve maternal symptoms of depression and self-esteem, cognitions about child behavior, and family impairment. Treated mothers also reported a reduction in problems related to their child’s behavior (Chronis, Gamble, Roberts, & Pelham, 2006).

Pharmacologic Interventions

A wide range of medications from different classes has been developed for the treatment of patients with ADHD (Table 3). These medications include amphetamine salts, methylphenidate, DEX methylphenidate, lisdexamfetamine, and atomoxetine (McDonagh, 2007; Swanson, 2003). These agents are available in a number of formulations that increase convenience and patient acceptability and permit once-daily dosing (Swanson). Results from a recently published meta-analysis of 29 clinical trials of medications for ADHD indicated that stimulant medications generally were superior to nonstimulant medications for the treatment of patients with ADHD (Figure 1) (Faraone, Biederman, Spencer, & Aleardi, 2006). Although varying methods of assessment across studies prohibited comparisons between specific medications, the differences between the broad classes of medications remained significant even after correcting for study design features that might have confounded the results (Faraone et al., 2006). The authors of the meta-analysis note that, in the absence of confirmatory head-to-head studies, caution is warranted when comparing the effects of different medications across studies.

The Children’s Medication Algorithm Project has provided a pharmacologic paradigm for the management of children with ADHD (Figure 1) (Pliszka et al., 2006). In this treatment algorithm, amphetamine or methylphenidate is the first choice for treatment (Stage 1). In patients who do not adequately improve with the first stimulant prescribed, or in whom adverse effects make long-term use inappropriate, pharmacologic therapy should be switched to another stimulant (Stage 2). Because dextroamphetamine and mixed salts amphetamines are viewed by some persons as separate agents, substages were added to stages 1 and 2 to provide the opportunity for trial of both amphetamine compounds before moving to the next stage (Stages 1A and 2A). If children fail to respond to stimulant medication, atomoxetine is recommended (Stage 3), with the option of combining atomoxetine with a stimulant (Stage 3A) in patients in need of better control of symptoms during school as well as long-term coverage with atomoxetine. Bupropion or a tricyclic agent is recommended for children who do not respond to atomoxetine (Stage 4). Alternative antidepressants (Stage 5) and n agonists (Stage 6) constitute the last stages in the treatment algorithm for patients in whom ADHD symptoms fail to improve despite use of previous therapies (Pliszka et al.).

Adherence. Although pharmacotherapy repeatedly has been shown to be effective for the treatment of patients with ADHD, significant problems may be associated with the use of these medications. One of the most important problems is poor adherence (Gau et al., 2006). A large number of reasons exist for poor treatment adherence, including the requirement of multiple daily doses, stigmatization, inconvenience, and diversion and misuse of medication (Gau et al.). Adherence to treatment with pharmacotherapy for ADHD may become more difficult in adolescents than in children, and there is a steady decline in adherence with age (Hazell, 2007).

There are many potential reasons for this decline in adherence, including the fact that adolescents have greater control over their treatment than children; embarrassment associated with having to take medication away from home; difficulty in gaining weight (particularly in boys); suppression of spontaneity; and dysphoric effects of treatment (Hazell). Emergence of comorbid depression or anxiety and increased risk of substance abuse also may contribute to lower adherence to therapy in adolescent patients with ADHD (Hazell). Factors that have been shown to be associated with better adherence include a stable family with high caregiver efficacy and satisfaction with medication, absence of oppositional defiant disorder, higher starting dose of medication, and younger age (Faraone, Biederman, & Zimmerman, 2007; Swanson, 2003; Thiruchelvam, Charach, & Schachar, 2001).

Many different types of interventions have the potential to improve adherence to therapy in patients with ADHD. For example, it has been shown that behavioral treatment is more acceptable than medication at initial diagnosis, and it may be useful to begin treatment with this approach (Swanson, 2003). Socioeconomic and demographic factors can affect adherence (e.g., adherence is poorer in Black and Asian populations than in the White population) (Faraone et al., 2007), and there is a need for culturally appropriate education targeted to all groups about the risks and benefits of treatment.

Dose optimization. Nurse practitioners or other clinicians managing
the patient with ADHD should carefully follow up with the patient and adjust the dose of medication to optimize outcomes. Once a child responds, there is no universally agreed-upon criterion for how much the symptoms must change before the clinician stops increasing the dose (Greenhill, Pliszka, & Dulkan, 2002). Clinicians should begin with the recommended starting dose according to the prescribing information of the agent used. If symptom control is not achieved, the dose generally should be increased in weekly increments (5-10 mg per dose for methylphenidate or 2.5-5 mg for amphetamines) (Greenhill et al.).

Three approaches are commonly used in clinical practice: prescribe...
and wait, gradually increase the dose until behavior improves, or increase the dose until adverse effects appear and then reduce the dose to the level before they appeared (Greenhill et al., 2002; Manos, Tom-Revzon, Bukstein, & Crismon, 2007). Alternatively, clinicians may elect to use a fixed-dose titration trial.
in which a full set of different doses is switched on a weekly basis. At the end of the trial, the parent and clinician can meet to decide which dose worked best for the child. The advantage of such a full-dose trial is that a child is less likely to miss a high dose that might yield additional improvement (Greenhill et al.). During the titration process, it is important to gain reliable information about the child’s behavior, adverse effects, and treatment efficacy (Manos et al.).

Managing adverse effects. Although the medications given for ADHD are relatively safe, some potential serious adverse effects need to be considered during treatment. In 2006, the Food and Drug Administration issued warnings involving sudden death with stimulant use in patients with pre-existing heart conditions. While sudden death is a risk in all patients with cardiac abnormalities and related diseases (e.g., hypertension), stimulants can potentiate this effect. However, with proper screening, the risk to the patient can be minimized (U.S. Food and Drug Administration, 2006). Because there is no cost-effective way to identify the few patients with these abnormalities, in-depth cardiovascular screening of all patients is not recommended (Greenhill et al., 2002). The clinician should monitor the patient’s blood pressure and heart rate, as well as listen to the heart at every visit. Baseline assessment of family history and symptoms is recommended. Significant family history (e.g., sudden death, cardiac arrhythmias, cardiomyopathy, syncope, and seizures) or symptoms that can indicate a cardiac condition (e.g., syncope, palpitations) warrant evaluation by a pediatric cardiologist (Vetter et al., 2008). In a recent publication, the American Heart Association recommends that because some cardiac conditions associated with sudden death might not be detected with routine physical examination, adding electrocardiography is reasonable (Vetter et al.). Parents and patients also should be advised to notify their health care provider if they experience symptoms indicative of undiagnosed cardiac problems after initiating therapy, such as shortness of breath, syncope, palpitations, or chest pain (U.S. Food and Drug Administration).

Loss of appetite resulting in failure to gain weight normally is an important adverse effect of pharmacotherapy for ADHD (Prince, Jensen, & Vierhile, 2006). Approaches to minimizing the impact of this problem include not forcing the child to eat meals, giving medication with meals, adding calorie-enhancing snacks to the diet, permitting grazing, and packing in calories at the beginning and end of the day (Prince et al.). In addition to weight loss, managing sleep problems that also may occur in patients receiving pharmacotherapy for ADHD includes asking about sleep patterns before starting medications, encouraging a sleep routine and behavior management, and adjusting/adding medications as needed (Prince et al.).

Drug abuse and dependence. Medications used for the treatment of ADHD have significant potential for diversion and abuse, and this potential has been a concern among those involved in the management of patients with this condition. It has been estimated that abuse and dependence of stimulant medications used to treat ADHD may occur in as many as 20% of patients (Kroutil et al., 2006; Wilens, Gignac, Sweeney, Monuteaux, & Biederman, 2006). However, several newer stimulant agents, such as extended-release formulations, have been shown to reduce this abuse potential (Ciccone et al., 2007).

Extended-release formulations minimize the sudden euphoric effect that is attributed to substance abuse potential, which is common with the immediate-release agents (Parasrampuria et al., 2007). Osmotic-release methylphenidate, a newer agent developed for the treatment of patients with ADHD,
has been shown to reduce the potential for abuse by approximately 55% secondary to its novel extended-release formulation (Gicone et al., 2007). In addition, lisdexamfetamine is formulated to not produce high dextroamphetamine levels when injected or snorted and thus may have lower abuse potential compared with conventional stimulants (Madaan, 2008). Therefore, utilizing newer long-acting agents may control the problematic abuse issues associated with this class of medications.

Complementary and alternative approaches to treatment. A variety of complementary and alternative approaches have been used to manage patients with ADHD. These approaches include dietary supplementation with essential fatty acids or diets free of food additives and sugar, yoga, biofeedback, homoeopathy, massage, and cerebellar training (Bishop, 2007; Rojas & Chan, 2005). Although initial evidence for some emerging complementary or alternative therapies, such as fatty acid supplementation, yoga, massage, homoeopathy, and green outdoor spaces, suggest potential benefits as part of an overall ADHD treatment plan, more rigorously designed studies are needed to support their use as effective alternatives to conventional monotherapy (Rojas & Chan).

Combining psychological/behavioral intervention with pharmacotherapy. Results from the Multimodal Treatment Study of Children with ADHD study showed that careful medication management, which included provisions for support, encouragement, practical advice, educational materials, and dose and medication adjustments based on parent and patient feedback, was significantly superior to standard community care for relieving ADHD symptoms. Most patients receiving community care received ADHD medications (principally one of the stimulants) from their own primary care provider but received no study treatments. Although the addition of behavioral treatment to the medication management program did not result in further significant reductions in ADHD symptoms compared with medication management alone, combined therapy did result in superior reduction in ADHD symptoms compared with behavioral therapy or community care alone (The MTA Cooperative Group, 1999). The results suggest that careful follow-up of patients taking medications, in addition to primarily educational intervention, may provide the best outcomes for patients with ADHD.

OVERCOMING COMMUNICATION CHALLENGES TO IMPROVE ADHERENCE AND TREATMENT SUCCESS

Advice for Parents

The use of behavioral approaches to complement pharmacotherapy in patients with ADHD often is overlooked, but such interventions can be helpful. Parents can take a number of relatively simple steps to improve outcomes for their children. These steps include using family meetings to generate goals and motivators, establishing clear expectations for children, rewarding desired behavior, keeping rewards novel, and providing immediate feedback for both positive and negative behaviors (Prince et al., 2006). It also is important to help the child with ADHD organize his or her activities. Posting a daily schedule for all activities and providing advance warning for schedule changes may be useful in this regard (Barlow, 2000).

Parental education. Parental education also is an important part of the overall management of the child or adolescent with ADHD. Parents with adolescents who have ADHD should be educated about how to manage ADHD symptoms during a stage of the child’s development when the emergence of abstract thinking, development of identity, individualization, risk-taking behaviors, and lability of mood are likely to occur (Prince et al., 2006). The importance of self-esteem during this stage also should be emphasized. A systematic literature review revealed that structured parental education can result in positive and sustained changes in both parental perceptions and objective measures of children’s behavior (Barlow & Stewart-Brown, 2000).

Taking an Active Role to Improve Scholastic Performance

Specific interventions also may improve performance at school for the child with ADHD, and active involvement of parents is necessary to effect these changes. It is important to gain information about the child’s strengths and weaknesses; this may require meeting with teachers and counselors and requesting testing if necessary. It also is important for parents to learn about the availability of school and private resources that may help their child (e.g., remedial help, tutorials, and study skills training) as well as promote self-education. It also may be useful to provide the teacher with a daily report card to record the child’s behavior (Prince et al., 2006).

There are two distinct approaches to assist the child with ADHD in the classroom setting (Table 4). (Fllipin, 2006) The first is an Individualized Education Program (IEP), in which parents, teachers, and other school staff work together to develop a plan for the delivery of special education and related services. The IEP describes the child’s learning problems, details the services to be provided, sets annual goals, and defines how progress will be measured. The second approach is based on Section 504 of the
Rehabilitation Act of 1973. Services usually included in a 504 Plan involve accommodations in the classroom (e.g., extra time to complete assignments) and sometimes assistive technology, such as computer-aided instruction, and access to therapy (ADDitude Editors, 2006a). Important issues to address with parents who are faced with a choice between these options include criteria for qualification, which may vary from one state to another, and which approach might be best for their child. It is particularly important to (a) insist that any plan be customized for each child and (b) carefully monitor the child’s progress (ADDitude Editors, 2006b).

Communication

Adolescents. Communication with adolescent patients may be particularly difficult because they often object to treatment of their ADHD (Nahlik, 2004). Communication may be improved by assuring confidentiality, listening carefully to what they say, respecting their opinions, and validating their feelings. It also may be necessary to mediate disputes between parents and adolescent patients and help them achieve acceptable compromises about important issues such as autonomy, driving, and peer relationships. Adherence to pharmacotherapy in adolescent patients with ADHD can be enhanced by explaining the benefits of medication, adverse effects, and the possibility of trials off medications if needed (Prince et al., 2006).

Special populations. Race and ethnicity are important variables that must be considered for both patients with ADHD and their parents. For example, Black parents may respond differently than White parents to behavioral cues from children and have different beliefs about the etiology of ADHD. They also may fear over-diagnosis or misdiagnosis of ADHD in their children and the associated stigma of mental illness. Black parents may be particularly concerned about the risks of pharmacotherapy for ADHD and are more likely to seek help from family members than from a health care professional (Bailey & Owens, 2005; Guevara et al., 2005; Hillemeier, Foster, Heinrichs, & Heier, 2007; Starr, 2007). Important sensitivities also exist regarding communication with Hispanic patients and their parents. A high stigma is associated with mental illness in this population, along with a distrust of the medications used for the treatment of ADHD. There also is a preference among some Hispanic groups for self-treatment and a holistic approach to the management of illness (Arcia, Fernández, & Jáquez, 2004; Starr).

Strategies that may be used to overcome cultural barriers to effective communication regarding ADHD include determining parents’ expectations regarding their child’s behavior at home and school. Gathering information from multiple settings about the child and his or her symptoms, providing education about the diagnosis and treatment of ADHD, and being culturally aware of differences in beliefs and attitudes about diagnosis and treatment will optimize communication and outcomes for families (Rothe, 2005; Starr, 2007).

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CONCLUSIONS

ADHD is a common condition that is most often diagnosed as children enter school. However, it is generally a lifelong disorder that does not spontaneously remit as the child progresses into adolescence and adulthood. About 80% of children who need medication for ADHD continue to require it as teenagers, and more than 50% will continue to require medication as adults. When not properly diagnosed and adequately treated, ADHD may have devastating effects on children and their families.

The symptoms of ADHD differ in preschoolers, school-aged children, and adolescents, which may complicate diagnosis of this condition. As academic demands increase in school, the child’s coping mechanisms start to fail. As a result, entrance or progression through school reveals the symptoms of ADHD to the child’s parents and primary care clinicians. Psychiatric comorbidities also can complicate both diagnosis and treatment. Clinicians also should be aware that other conditions, such as infection, seizures, anxiety, or depression, can produce symptoms that mimic ADHD.

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Children with ADHD require effective treatment to decrease the patient, family, and societal burdens associated with this common condition. Medications for ADHD help many children focus and be more successful at school, home, and play. Behavioral therapy, emotional counseling, and practical support should be combined with medical treatment.

Many barriers exist to the accurate diagnosis and effective treatment of ADHD, but there are also strategies that can be used to overcome them. Management of patients can be enhanced by carefully assessing the home and school environments to improve organization and decrease distractions and frustration. Engaging the entire family in the treatment plan and providing needed interventions for all family members enhances adherence and treatment effectiveness. Educating the child and parents about options for care and understanding racial/ethnic sensitivities that may influence responses to diagnosis and treatment recommendations also can enhance treatment adherence and effectiveness. To optimize outcomes, nurse practitioners must utilize evidence-based therapy consistent with current standards of care and provide continuing education, support, and advocacy for patients and their families.

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