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## **Clinical Practice Guideline: Diagnosis and Evaluation of the Child With Attention-Deficit/Hyperactivity Disorder**

Committee on Quality Improvement, Subcommittee on  
Attention-Deficit/Hyperactivity Disorder  
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# AMERICAN ACADEMY OF PEDIATRICS

Committee on Quality Improvement, Subcommittee on Attention-Deficit/Hyperactivity Disorder

## Clinical Practice Guideline: Diagnosis and Evaluation of the Child With Attention-Deficit/Hyperactivity Disorder

**ABSTRACT.** This clinical practice guideline provides recommendations for the assessment and diagnosis of school-aged children with attention-deficit/hyperactivity disorder (ADHD). This guideline, the first of 2 sets of guidelines to provide recommendations on this condition, is intended for use by primary care clinicians working in primary care settings. The second set of guidelines will address the issue of treatment of children with ADHD.

The Committee on Quality Improvement of the American Academy of Pediatrics selected a committee composed of pediatricians and other experts in the fields of neurology, psychology, child psychiatry, development, and education, as well as experts from epidemiology and pediatric practice. In addition, this panel consists of experts in education and family practice. The panel worked with Technical Resources International, Washington, DC, under the auspices of the Agency for Healthcare Research and Quality, to develop the evidence base of literature on this topic. The resulting evidence report was used to formulate recommendations for evaluation of the child with ADHD. Major issues contained within the guideline address child and family assessment; school assessment, including the use of various rating scales; and conditions seen frequently among children with ADHD. Information is also included on the use of current diagnostic coding strategies. The deliberations of the committee were informed by a systematic review of evidence about prevalence, coexisting conditions, and diagnostic tests. Committee decisions were made by consensus where definitive evidence was not available. The committee report underwent review by sections of the American Academy of Pediatrics and external organizations before approval by the Board of Directors.

The guideline contains the following recommendations for diagnosis of ADHD: 1) in a child 6 to 12 years old who presents with inattention, hyperactivity, impulsivity, academic underachievement, or behavior problems, primary care clinicians should initiate an evaluation for ADHD; 2) the diagnosis of ADHD requires that a child meet *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* criteria; 3) the assessment of ADHD requires evidence directly obtained from parents or caregivers regarding the core symptoms of ADHD in various settings, the age of onset, duration of symptoms, and degree of functional impairment; 4) the assessment of ADHD requires evidence directly obtained from the classroom teacher (or other school professional) regarding the core symptoms of ADHD, duration of symptoms, degree of functional impairment, and associated conditions; 5) evaluation of the child with ADHD should in-

clude assessment for associated (coexisting) conditions; and 6) other diagnostic tests are not routinely indicated to establish the diagnosis of ADHD but may be used for the assessment of other coexisting conditions (eg, learning disabilities and mental retardation).

This clinical practice guideline is not intended as a sole source of guidance in the evaluation of children with ADHD. Rather, it is designed to assist primary care clinicians by providing a framework for diagnostic decisionmaking. It is not intended to replace clinical judgment or to establish a protocol for all children with this condition and may not provide the only appropriate approach to this problem.

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ABBREVIATIONS. ADHD, attention-deficit/hyperactivity disorder; *DSM-IV*, *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*; AAP, American Academy of Pediatrics; *DSM-PC*, *Diagnostic and Statistical Manual for Primary Care*.

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Attention-deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood. ADHD is also among the most prevalent chronic health conditions affecting school-aged children. The core symptoms of ADHD include inattention, hyperactivity, and impulsivity.<sup>1,2</sup> Children with ADHD may experience significant functional problems, such as school difficulties, academic underachievement,<sup>3</sup> troublesome interpersonal relationships with family members<sup>4,5</sup> and peers, and low self-esteem. Individuals with ADHD present in childhood and may continue to show symptoms as they enter adolescence<sup>6</sup> and adult life.<sup>7</sup> Pediatricians and other primary care clinicians frequently are asked by parents and teachers to evaluate a child for ADHD. Early recognition, assessment, and management of this condition can redirect the educational and psychosocial development of most children with ADHD.<sup>8,9</sup>

Recorded prevalence rates for ADHD vary substantially, partly because of changing diagnostic criteria over time,<sup>10-13</sup> and partly because of variations in ascertainment in different settings and the frequent use of referred samples to estimate rates. Practitioners of all types (primary care, subspecialty, psychiatry, and nonphysician mental health providers) vary greatly in the degree to which they use *Diagnostic and Statistical Manual of Mental Health Disorders, Fourth Edition (DSM-IV)* criteria to diagnose ADHD. Reported rates also vary substantially in different geographic areas and across countries.<sup>14</sup>

With increasing epidemiologic and clinical research, diagnostic criteria have been revised on mul-

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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multiple occasions over the past 20 years.<sup>10–13</sup> A recent review of prevalence rates in school-aged community samples (rather than referred samples) indicates rates varying from 4% to 12%, with estimated prevalence based on combining these studies of ~8% to 10%. In the general population,<sup>15–23,24</sup> 9.2% (5.8%–13.6%) of males and 2.9% (1.9%–4.5%) of females are found to have behaviors consistent with ADHD. With the *DSM-IV* criteria (compared with earlier versions), more females have been diagnosed with the predominantly inattentive type.<sup>25,26</sup> Prevalence rates also vary significantly depending on whether they reflect school samples 6.9% (5.5%–8.5%) versus community samples 10.3% (8.2%–12.7%).

Public interest in ADHD has increased along with debate in the media concerning the diagnostic process and treatment strategies.<sup>27</sup> Concern has been expressed about the over-diagnosis of ADHD by pointing to the several-fold increase in prescriptions for stimulant medication among children during the past decade.<sup>28</sup> In addition, there are significant regional variations in the amount of stimulants prescribed by physicians.<sup>29</sup> Practice surveys among primary care pediatricians and family physicians reveal wide variations in practice patterns about diagnostic criteria and methods.<sup>30</sup>

ADHD commonly occurs in association with oppositional defiant disorder, conduct disorder, depression, anxiety disorder,<sup>16</sup> and with many developmental disorders, such as speech and language delays and learning disabilities.

This diagnostic guideline is intended for use by primary care clinicians to evaluate children between 6 and 12 years of age for ADHD, consistent with best available empirical studies. Special attention is given to assessing school performance and behavior, family functioning, and adaptation. In light of the high prevalence of ADHD in pediatric practice, the guideline should assist primary care clinicians in these assessments. The diagnosis usually requires several steps. Clinicians will generally need to carry out the evaluation in more than 1 visit, often indeed 2 to 3 visits. The guideline is not intended for children with mental retardation, pervasive developmental disorder, moderate to severe sensory deficits such as visual and hearing impairment, chronic disorders associated with medications that may affect behavior, and those who have experienced child abuse and sexual abuse. These children too may have ADHD, and this guideline may help clinicians in considering this diagnosis; nonetheless, this guideline primarily reviews evidence relating to the diagnosis of ADHD in relatively uncomplicated cases in primary care settings.

#### METHODOLOGY

To initiate the development of a practice guideline for the diagnosis and evaluation of children with ADHD directed toward primary care physicians, the American Academy of Pediatrics (AAP) worked with several colleague organizations to organize a working panel representing a wide range of primary care and subspecialty groups. The committee, chaired by 2 general pediatricians (1 with substantial

additional experience and training in developmental and behavioral pediatrics), included representatives from the American Academy of Family Physicians, the American Academy of Child and Adolescent Psychiatry, the Child Neurology Society, and the Society for Pediatric Psychology, as well as developmental and behavioral pediatricians and epidemiologists.

This group met over a period of 2 years, during which it reviewed basic literature on current practices in the diagnosis of ADHD and developed a series of questions to direct an evidence-based review of the prevalence of ADHD in community and primary care practice settings, the rates of coexisting conditions, and the utility of several diagnostic methods and devices. The AAP committee collaborated with the Agency for Healthcare Research and Quality in its support of an evidence-based review of several of these key items in the diagnosis of ADHD. David Atkins, MD, provided liaison from the Agency for Healthcare Research and Quality, and Technical Resources International conducted the evidence review.

The Technical Resources International report focused on 4 specific areas for the literature review: the prevalence of ADHD among children 6 to 12 years of age in the general population and the coexisting conditions that may occur with ADHD; the prevalence of ADHD among children in primary care settings and the coexisting conditions that may occur; the accuracy of various screening methods for diagnosis; and the prevalence of abnormal findings on commonly used medical screening tests. The literature search was conducted using Medline and PsycINFO databases, references from review articles, rating scale manuals, and articles identified by the subcommittee. Only articles published in English between 1980 and 1997 were included. The study population was limited to children 6 to 12 years of age, and only studies using general, unselected populations in communities, schools, or the primary clinical setting were used. Data on screening tests were taken from studies conducted in any setting. Articles accepted for analysis were abstracted twice by trained personnel and a clinical specialist. Both abstracts for each article were compared and differences between them resolved. A multiple logistic regression model with random effects was used to analyze simultaneously for age, gender, diagnostic tool, and setting using EGRET software. Results were presented in evidence tables and published in the final evidence report.<sup>24</sup>

The draft practice guideline underwent extensive peer review by committees and sections within the AAP, by numerous outside organizations, and by other individuals identified by the subcommittee. Liaisons to the subcommittee also were invited to distribute the draft to entities within their organizations. The resulting comments were compiled and reviewed by the subcommittee co-chairpersons, and relevant changes were incorporated into the draft based on recommendations from peer reviewers.

The recommendations contained in the practice guideline are based on the best available data (Fig 1).

Where data were lacking, a combination of evidence and expert consensus was used. Strong recommendations were based on high-quality scientific evidence, or, in the absence of high-quality data, strong expert consensus. Fair and weak recommendations were based on lesser quality or limited data and expert consensus. Clinical options were identified as interventions because the subcommittee could not find compelling evidence for or against. These clinical options are interventions that a reasonable health care provider might or might not wish to implement in his or her practice.

**RECOMMENDATION 1:** *In a child 6 to 12 years old who presents with inattention, hyperactivity, impulsivity, academic underachievement, or behavior problems, primary care clinicians should initiate an evaluation for ADHD (strength of evidence: good; strength of recommendation: strong).*

The major justification for this recommendation is the high prevalence of ADHD in school-aged populations. School-aged children with a variety of developmental and behavioral concerns present to primary care clinicians.<sup>31</sup> Primary care pediatricians and family physicians recognize behavior problems that may impact academic achievement in 18% of school-aged children seen in their offices and clinics. Hyperactivity or inattention is diagnosed in 9% of children.<sup>32</sup>

Presentations of ADHD in clinical practice vary. In many cases, concerns derive from parents, teachers, other professionals, or nonparental caregivers. Common presentations include referral from school for academic underachievement and failure, disruptive classroom behavior, inattentiveness, problems with social relationships, parental concerns regarding similar phenomena, poor self-esteem, or problems with establishing or maintaining social relationships. Children with core ADHD symptoms of hyperactivity and impulsivity are identified by teachers, because they often disrupt the classroom. Even mild distractibility and motor symptoms, such as fidgetiness, will be apparent to most teachers. In contrast, children with the inattentive subtype of ADHD, where hyperactive and impulsive symptoms are absent or minimal, may not come to the attention of teachers. These children may present with school underachievement.

Symptoms may not be apparent in a structured clinical setting that is free from the demands and distraction of the home and school.<sup>33</sup> Thus, if parents do not bring concerns to the primary clinician, then early detection of ADHD in primary care may not occur. Clinical practices during routine health supervision may assist in early recognition of ADHD.<sup>34,35</sup> Options include direct history from parents and children. The following general questions may be useful at all visits for school-aged children to heighten attention about ADHD and as an initial screening for school performance.

1. How is your child doing in school?
2. Are there any problems with learning that you or the teacher has seen?

3. Is your child happy in school?
4. Are you concerned with any behavioral problems in school, at home, or when your child is playing with friends?
5. Is your child having problems completing classwork or homework?

Alternatively, a previsit questionnaire may be sent to parents or given while the family is waiting in the reception area.<sup>36</sup> When making an appointment for a health supervision visit for a school-aged child, 1 or 2 of these questions may be asked routinely to sensitize parents to the concerns of their child's clinician. For example, "Your child's clinician is interested in how your child is doing in school. You might check with her teacher and discuss any concerns with your child's physician." Wall posters, pamphlets, and books in the waiting area that focus on educational achievements and school-aged behaviors send a message that this is an office or clinic that considers these issues important to a child's development.<sup>37</sup>

**RECOMMENDATION 2:** *The diagnosis of ADHD requires that a child meet DSM-IV criteria (strength of evidence: good; strength of recommendation: strong).*

Establishing a diagnosis of ADHD requires a strategy that minimizes over-identification and under-identification. Pediatricians and other primary care health professionals should apply *DSM-IV* criteria in the context of their clinical assessment of a child. The use of specific criteria will help to ensure a more accurate diagnosis and decrease variation in how the diagnosis is made. The *DSM-IV* criteria, developed through several iterations by the American Psychiatric Association, are based on clinical experience and an expanding research foundation.<sup>13</sup> These criteria have more support in the literature than other available diagnostic criteria. The *DSM-IV* specification of behavior items, required numbers of items, and levels of impairment reflect the current consensus among clinicians, particularly psychiatry. The consensus includes increasing research evidence, particularly in the distinctions that the *DSM-IV* makes for the dimensions of attention and hyperactivity-impulsivity.<sup>38</sup>

The *DSM-IV* criteria define 3 subtypes of ADHD (see Table 1 for specific inattention and hyperactive-impulsive items).

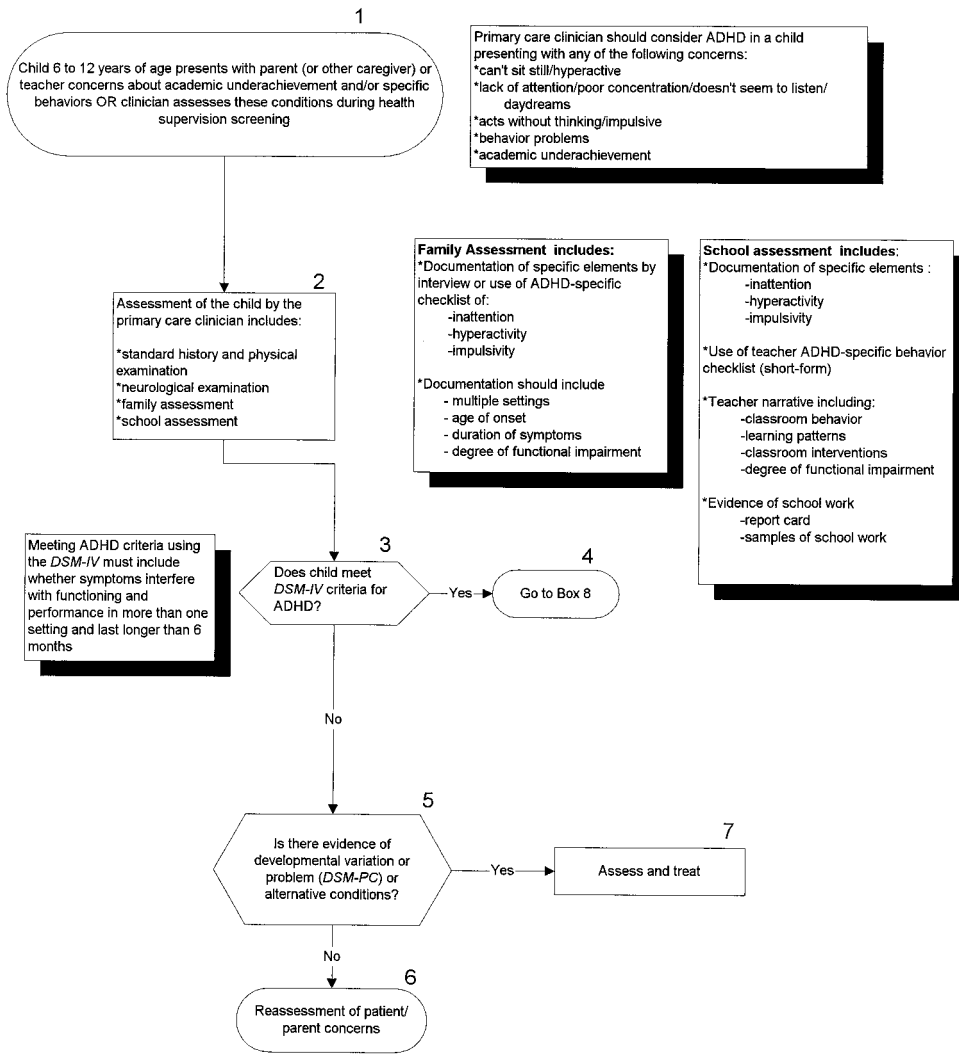
- ADHD primarily of the inattentive type (ADHD/I, meeting at least 6 of 9 inattention behaviors)
- ADHD primarily of the hyperactive-impulsive type (ADHD/HI, meeting at least 6 of 9 hyperactive-impulsive behaviors)
- ADHD combined type (ADHD/C, meeting at least 6 of 9 behaviors in both the inattention and hyperactive-impulsive lists)

Children who meet diagnostic criteria for the behavioral symptoms of ADHD but who demonstrate no functional impairment do not meet the diagnostic criteria for ADHD.<sup>13</sup> The symptoms of ADHD should be present in 2 or more settings (eg, at home and in school), and the behaviors must adversely affect

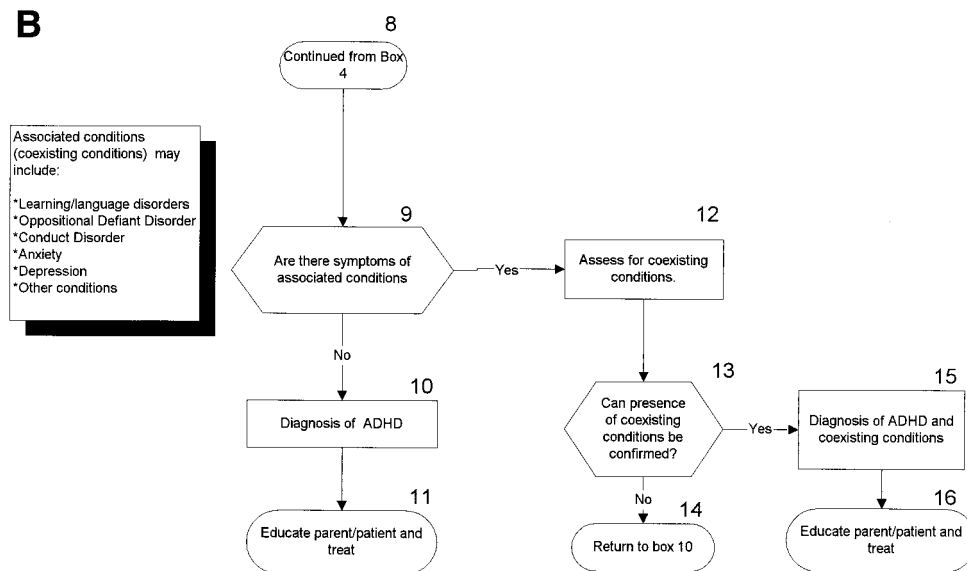
**A**

**Diagnosis and Evaluation of the Child with Attention-Deficit/Hyperactivity Disorder**

**Clinical Algorithm**



**B**



**Fig 1. Clinical algorithm.**

**TABLE 1.** Diagnostic Criteria for ADHD

- A. Either 1 or 2
- 1) Six (or more) of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:  
*Inattention*
    - a) Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
    - b) Often has difficulty sustaining attention in tasks or play activities
    - c) Often does not seem to listen when spoken to directly
    - d) Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
    - e) Often has difficulty organizing tasks and activities
    - f) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
    - g) Often loses things necessary for tasks or activities (eg, toys, school assignments, pencils, books, or tools)
    - h) Is often easily distracted by extraneous stimuli
    - i) Is often forgetful in daily activities
  - 2) Six (or more) of the following symptoms of **hyperactivity-impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:  
*Hyperactivity*
    - a) Often fidgets with hands or feet or squirms in seat
    - b) Often leaves seat in classroom or in other situations in which remaining seated is expected
    - c) Often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
    - d) Often has difficulty playing or engaging in leisure activities quietly
    - e) Is often "on the go" or often acts as if "driven by a motor"
    - f) Often talks excessively  
*Impulsivity*
    - g) Often blurts out answers before questions have been completed
    - h) Often has difficulty awaiting turn
    - i) Often interrupts or intrudes on others (eg, butts into conversations or games)
- B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before 7 years of age.  
C. Some impairment from the symptoms is present in 2 or more settings (eg, at school [or work] or at home).  
D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.  
E. The symptoms do not occur exclusively during the course of a pervasive developmental disorder, schizophrenia, or other psychotic disorder and are not better accounted for by another mental disorder (eg, mood disorder, anxiety disorder, dissociative disorder, or personality disorder).
- Code based on type:  
**314.01 Attention-Deficit/Hyperactivity Disorder, Combined Type:** if both criteria A1 and A2 are met for the past 6 months  
**314.00 Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type:** if criterion A1 is met but criterion A2 is not met for the past 6 months  
**314.01 Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive, Impulsive Type:** if criterion A2 is met but criterion A1 is not met for the past 6 months  
**314.9 Attention-Deficit/Hyperactivity Disorder Not Otherwise Specified**

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functioning in school or in a social situation. Reliable and clinically valid measures of dysfunction applicable to the primary care setting have been difficult to develop. The diagnosis comes from a synthesis of information obtained from parents; school reports; mental health care professionals, if they have been involved; and an interview/examination of the child. Current *DSM-IV* criteria require evidence of symptoms before 7 years of age. In some cases, the symptoms of ADHD may not be recognized by parents or teachers until the child is older than 7 years of age, when school tasks become more challenging. Age of onset and duration of symptoms may be obtained from parents in the course of a comprehensive history.

Teachers, parents, and child health professionals typically encounter children with behaviors relating to activity, impulsivity, and attention who may not fully meet *DSM-IV* criteria. The *Diagnostic and Statistical Manual for Primary Care (DSM-PC)*, *Child and Adolescent Version*,<sup>39</sup> provides a guide to the more common behaviors seen in pediatrics. The manual describes common variations in behavior, as well as more problematic behaviors, at levels less than those

specified in the *DSM-IV* (and with less impairment). The behavioral descriptions of the *DSM-PC* have not yet been tested in community studies to determine the prevalence or severity of developmental variations and moderate problems in the areas of inattention and hyperactivity or impulsivity. They do, however, provide guidance to clinicians in the evaluation of children with these symptoms and help to direct clinicians to many elements of treatment for children with problems with attention, hyperactivity, or impulsivity (Tables 2 and 3). The *DSM-PC* also considers environmental influences on a child's behavior and provides information on differential diagnosis with a developmental perspective.

Given the lack of methods to confirm the diagnosis of ADHD through other means, it is important to recognize the limitations of the *DSM-IV* definition. Most of the development and testing of the *DSM-IV* has occurred through studies of children seen in psychiatric settings. Much less is known about its use in other populations, such as those seen in general pediatric or family practice settings. Despite the agreement of many professionals working in this field, the *DSM-IV* criteria remain a consensus with-

**TABLE 2.** DSM-PC: Developmental Variation: Impulsive/Hyperactive Behaviors

Developmental Variation	Common Developmental Presentations
<p><i>V65.49 Hyperactive/impulsive variation</i>                      Young children in infancy and in the preschool years are normally very active and impulsive and may need constant supervision to avoid injury. Their constant activity may be stressful to adults who do not have the energy or patience to tolerate the behavior. During school years and adolescence, activity may be high in play situations and impulsive behaviors may normally occur, especially in peer pressure situations.                      High levels of hyperactive/impulsive behavior do not indicate a problem or disorder if the behavior does not impair function.</p>	<p><i>Early childhood</i></p> <p>The child runs in circles, doesn't stop to rest, may bang into objects or people, and asks questions constantly.</p> <p><i>Middle childhood</i></p> <p>The child plays active games for long periods. The child may occasionally do things impulsively, particularly when excited.</p> <p><i>Adolescence</i></p> <p>The adolescent engages in active social activities (eg, dancing) for long periods, may engage in risky behaviors with peers.</p>
<p>Special Information</p>	
<p>Activity should be thought of not only in terms of actual movement, but also in terms of variations in responding to touch, pressure, sound, light, and other sensations. Also, for the infant and young child, activity and attention are related to the interactions between the child and caregiver, eg, when sharing attention and playing together.</p> <p>Activity and impulsivity often normally increase when the child is tired or hungry and decrease when sources of fatigue or hunger are addressed.</p> <p>Activity normally may increase in new situations or when the child may be anxious. Familiarity then reduces activity.</p> <p>Both activity and impulsivity must be judged in the context of the caregiver's expectations and the level of stress experienced by the caregiver. When expectations are unreasonable, the stress level is high, and/or the parent has an emotional disorder (especially depression), the adult may exaggerate the child's level of activity/impulsivity.</p> <p>Activity level is a variable of temperature. The activity level of some children is on the high end of normal from birth and continues to be high throughout their development.</p>	

Taken from: American Academy of Pediatrics. *The Classification of Child and Adolescent Mental Diagnoses in Primary Care. Diagnostic and Statistical Manual for Primary Care (DSM-PC), Child and Adolescent Version*. Elk Grove Village, IL: American Academy of Pediatrics; 1996

out clear empirical data supporting the number of items required for the diagnosis. Current criteria do not take into account gender differences or developmental variations in behavior. Furthermore, the behavioral characteristics specified in the *DSM-IV*, despite efforts to standardize them, remain subjective and may be interpreted differently by different observers. Continuing research will likely clarify the validity of the *DSM-IV* criteria (and subsequent modifications) in the diagnosis. These complexities in the diagnosis mean that clinicians using *DSM-IV* criteria must apply them in the context of their clinical judgment.

No instruments used in primary care practice reliably assess the nature or degree of functional impairment of children with ADHD. With information obtained from the parent and school, the clinician can make a clinical judgment about the effect of the core and associated symptoms of ADHD on aca-

ademic achievement, classroom performance, family and social relationships, independent functioning, self-esteem, leisure activities, and self-care (such as bathing, toileting, dressing, and eating).

The following 2 recommendations establish the presence of core behavior symptoms in multiple settings.

**RECOMMENDATION 3:** *The assessment of ADHD requires evidence directly obtained from parents or caregivers regarding the core symptoms of ADHD in various settings, the age of onset, duration of symptoms, and degree of functional impairment (strength of evidence: good; strength of recommendation: strong).*

Behavior symptoms may be obtained from parents or guardians using 1 or more methods, including open-ended questions (eg, "What are your concerns about your child's behavior in school?"), focused

**TABLE 3.** DSM-PC: Developmental Variation: Inattentive Behaviors

Developmental Variation	Common Developmental Presentations
<p><i>V65.49 Inattention variation</i>                      A young child will have a short attention span that will increase as the child matures. The inattention should be appropriate for the child's level of development and not cause any impairment.</p>	<p><i>Early childhood</i></p> <p>The preschooler has difficulty attending, except briefly, to a storybook or a quiet task such as coloring or drawing.</p> <p><i>Middle childhood</i></p> <p>The child may not persist very long with a task the child does not want to do such as read an assigned book, homework, or a task that requires concentration such as cleaning something.</p> <p><i>Adolescence</i></p> <p>The adolescent is easily distracted from tasks he or she does not desire to perform.</p>
Special Information	
<p>Infants and preschoolers usually have very short attention spans and normally do not persist with activities for long, so that diagnosing this problem in younger children may be difficult. Some parents may have a low tolerance for developmentally appropriate inattention. Although watching television cartoons for long periods of time appears to reflect a long attention span, it does not reflect longer attention spans because most television segments require short (2- to 3-minute) attention spans and they are very stimulating. Normally, attention span varies greatly depending upon the child's or adolescent's interest and skill in the activity, so much so that a short attention span for a particular task may reflect the child's skill or interest in that task.</p>	

Taken from: American Academy of Pediatrics. *The Classification of Child and Adolescent Mental Diagnoses in Primary Care. Diagnostic and Statistical Manual for Primary Care (DSM-PC), Child and Adolescent Version*. Elk Grove Village, IL: American Academy of Pediatrics; 1996

questions about specific behaviors, semi-structured interview schedules, questionnaires, and rating scales. Clinicians who obtain information from open-ended or focused questions must obtain and record the relevant behaviors of inattention, hyperactivity, and impulsivity from the *DSM-IV*. The use of global clinical impressions or general descriptions within the domains of attention and activity is insufficient to diagnose ADHD. As data are gathered about the child's behavior, an opportunity becomes available to evaluate the family environment and parenting style. In this way, behavioral symptoms may be evaluated in the context of the environment that may have important characteristics for a particular child.

Specific questionnaires and rating scales have been developed to review and quantify the behavioral characteristics of ADHD (Table 4). The ADHD-specific questionnaires and rating scales have been shown to have an odds ratio greater than 3.0 (equivalent to sensitivity and specificity greater than 94%) in studies differentiating children with ADHD from normal, age-matched, community controls.<sup>24</sup> Thus, ADHD-specific rating scales accurately distinguish between children with and without the diagnosis of ADHD. Almost all studies of these scales and checklists have taken place under ideal conditions, ie, comparing children in referral sites with apparently

healthy children. These instruments may function less well in primary care clinicians' offices than indicated in the tables. In addition, questions on which these rating scales are based are subjective and subject to bias. Thus, their results may convey a false sense of validity and must be interpreted in the context of the overall evaluation of the child. Whether these scales provide additional benefit beyond careful clinical assessment informed by *DSM-IV* criteria is not known. **RECOMMENDATION 3A: Use of these scales is a clinical option when evaluating children for ADHD (strength of evidence: strong; strength of recommendation: strong).**

Global, nonspecific questionnaires and rating scales that assess a variety of behavioral conditions, in contrast with the ADHD-specific measures, generally have an odds ratio <2.0 (equivalent to sensitivity and specificity <86%) in studies differentiating children referred to psychiatric practices from children who were not referred to psychiatric practices (Table 5). Thus, these broadband scales do not distinguish well between children with and without ADHD. **RECOMMENDATION 3B: Use of broadband scales is not recommended in the diagnosis of children for ADHD, although they may be useful for other purposes (strength of evidence: strong; strength of recommendation: strong).**

**TABLE 4.** Total ADHD-Specific Checklists: Ability to Detect ADHD vs Normal Controls

Study	Behavior Rating Scale	Age	Gender	Effect Size	95% Confidence Limits
Conners (1997)	CPRS-R:L-ADHD Index (Conners Parent Rating Scale—1997 Revised Version: Long Form, ADHD Index Scale)	6–17	MF	3.1	2.5, 3.7
Conners (1997)	CTRS-R:L-ADHD Index (Conners Teacher Rating Scale—1997 Revised Version: Long Form, ADHD Index Scale)	6–17	MF	3.3	2.8, 3.8
Conners (1997)	CPRS-R:L- <i>DSM-IV</i> Symptoms (Conners Parent Rating Scale—1997 Revised Version: Long Form, <i>DSM-IV</i> Symptoms Scale)	6–17	MF	3.4	2.8, 4.0
Conners (1997)	CTRS-R:L- <i>DSM-IV</i> Symptoms (Conners Teacher Rating Scale—1997 Revised Version: Long Form, <i>DSM-IV</i> Symptoms Scale)	6–17	MF	3.7	3.2, 4.2
Breen (1989)	SSQ-O-I Barkley's School Situations Questionnaire-Original Version, Number of Problem Settings Scale	6–11	F	1.3	0.5, 2.2
Breen (1989)	SSQ-O-II Barkley's School Situations Questionnaire-Original Version, Mean Severity Scale	6–11	F	2.0	1.0, 2.9
Combined				2.9	2.2, 3.5

Taken from: Green M, Wong M, Atkins D, et al. *Diagnosis of Attention Deficit/Hyperactivity Disorder. Technical Review 3.* Rockville, MD: US Department of Health and Human Services, Agency for Health Care Policy and Research; 1999. AHCPR publication 99-0050

**TABLE 5.** Total Scales of Broadband Checklists: Ability to Detect Referred vs Nonreferred

Study	Behavior Rating Scale	Age	Gender	Effect Size	95% Confidence Limits
Achenbach (1991b)	CBCL/4-18-R, Total Problem Scale (Child Behavior Checklist for Ages 4–18, Parent Form)	4–11	M	1.4	1.3, 1.5
Achenbach (1991b)	Same as above	4–11	F	1.3	1.2, 1.4
Achenbach (1991c)	CBCL/TRF-R, Total Problem Scale (Child Behavior Checklist, Teacher Form)	5–11	M	1.2	1.0, 1.4
Achenbach (1991c)	Same as above	5–11	F	1.1	1.0, 1.3
Naglieri, LeBuffe, Pfeiffer (1994)	DSMD-Total Scale (Devereaux Scales of Mental Disorders)	5–12	MF	1.0	0.8, 1.3
Conners (1997)	CPRS-R:L-Global Problem Index (1997 Revision of Conners Parent Rating Scale, Long Version)	—	MF	2.3	1.9, 2.6
Conners (1997)	CTRS-R:L-Global Problem Index (1997 Revision of Conners Teacher Rating Scale, Long Version)	—	MF	2.0	1.7, 2.3
Combined				1.5	1.2, 1.8

Taken from: Green M, Wong M, Atkins D, et al. *Diagnosis of Attention Deficit/Hyperactivity Disorder. Technical Review 3.* Rockville, MD: US Department of Health and Human Services, Agency for Health Care Policy and Research; 1999. AHCPR publication 99-0050.

More research is needed on the use of the ADHD-specific and global rating scales in pediatric practices for the purposes of differentiating children with ADHD from other children with different behavior or school problems.

**RECOMMENDATION 4:** *The assessment of ADHD requires evidence directly obtained from the classroom teacher (or other school professional) regarding the core symptoms of ADHD, the duration of symptoms, the degree of functional impairment, and coexisting conditions. A physician should review any reports from a school-based multidisciplinary evaluation where they exist, which will include assessments from the teacher or other school-based professional (strength of evidence: good; strength of recommendation: strong).*

The evaluation of ADHD must establish whether core behavior symptoms of inattention, hyperactiv-

ity, and impulsivity are present in >1 setting to meet *DSM-IV* criteria for the condition. Children 6 to 12 years of age generally are students in an elementary school setting, where they spend a substantial proportion of waking hours. Therefore, a description of their behavioral characteristics in the school setting is highly important to the evaluation. With permission from the legal guardian, the clinician should review a report from the child's school. The classroom teacher typically has more information about the child's behavior than do other professionals at the school and, when possible, should provide the report. Alternatively, a school counselor or principal often is helpful in coordinating the teacher's reporting and may be able to provide the required information.

Behavior symptoms may be obtained using 1 or more methods such as verbal narratives, written narratives, questionnaires, or rating scales. Clinicians

who obtain information from narratives or interviews must obtain and record the relevant behaviors of inattention, hyperactivity, and impulsivity from the *DSM-IV*. The use of global clinical impressions or general descriptions within the domains of attention and activity is insufficient to diagnose ADHD.

The ADHD-specific questionnaires and rating scales also are available for teachers (Table 4). Teacher ADHD-specific questionnaires and rating scales have been shown to have an odds ratio >3.0 (equivalent to sensitivity and specificity greater than 94%) in studies differentiating children with ADHD from normal peers in the community.<sup>24</sup> Thus, teacher ADHD-specific rating scales accurately distinguish between children with and without the diagnosis of ADHD. Whether these scales provide additional benefit beyond narratives or descriptive interviews informed by *DSM-IV* criteria is not known. **RECOMMENDATION 4A:** *Use of these scales is a clinical option when diagnosing children for ADHD (strength of evidence: strong; strength of recommendation: strong).*

Teacher global questionnaires and rating scales that assess a variety of behavioral conditions, in contrast with the ADHD-specific measures, generally have an odds ratio <2.0 (equivalent to sensitivity and specificity <86%) in studies differentiating children referred to psychiatric practices from children who were not referred to psychiatric practices (Table 5). Thus, these broadband scales do not distinguish between children with and without ADHD. **RECOMMENDATION 4B:** *Use of teacher global questionnaires and rating scales is not recommended in the diagnosing of children for ADHD, although they may be useful for other purposes (strength of evidence: strong; strength of recommendation: strong).*

If a child 6 to 12 years of age routinely spends considerable time in other structured environments such as after-school care centers, additional information about core symptoms can be sought from professionals in those settings, contingent on parental permission. The ADHD-specific questionnaires may be used to evaluate the child's behavior in these settings. For children who are educated in their homes by parents, evidence of the presence of core behavior symptoms in settings other than the home should be obtained as an essential part of the evaluation.

Frequently there are significant discrepancies between parent and teacher ratings.<sup>40</sup> These discrepancies may be in either direction; symptoms may be reported by teachers and not parents or vice versa. These discrepancies may be attributable to differences between the home and school in terms of expectations, levels of structure, behavioral management strategies, and/or environmental circumstances. The finding of a discrepancy between the parents and teachers does not preclude the diagnosis of ADHD. A helpful clinical approach for understanding the sources of the discrepancies and whether the child meets *DSM-IV* criteria is to obtain additional information from other informants, such as former teachers, religious leaders, or coaches.

**RECOMMENDATION 5:** *Evaluation of the child with ADHD should include assessment for coexisting conditions (strength of evidence: strong; strength of recommendation: strong).*

A variety of other psychological and developmental disorders frequently coexist in children who are being evaluated for ADHD. As many as one third of children with ADHD have 1 or more coexisting conditions (Table 6). Although the primary care clinician may not always be in a position to make a precise diagnosis of coexisting conditions, consideration and examination for such a coexisting condition should be an integral part of the evaluation. A review of all coexisting conditions (such as motor disabilities, problems with parent-child interaction, or family violence) is not possible within the scope of this review. More common psychological disorders include conduct and oppositional defiant disorder, mood disorders, anxiety disorders, and learning disabilities. The pediatrician should also consider ADHD as a coexisting condition when considering these other conditions. Evidence for most of these coexisting disorders may be readily detected by the primary care clinician. For example, frequent sadness and preference for isolated activities may alert the physician to the presence of depressive symptoms, whereas a family history of anxiety disorders coupled with a patient history characterized by frequent fears and difficulties with separation from caregivers may be suggestive of symptoms associated with an anxiety disorder. Several screening tests are available that can detect areas of concern for many of the mental health disorders that coexist with ADHD. Although these scales have not been tested for use in primary care settings and are not diagnostic tests for either ADHD or associated mental health conditions, some clinicians may find them useful to establish high risk for coexisting psychological conditions. Similarly, poor school performance may indicate a learning disability. Testing may be required to determine whether a discrepancy exists between the child's learning potential (intelligence quotient) and his actual academic progress (achievement test scores), indicating the presence of a learning disability. Most studies of rates of coexisting conditions have come from referral populations. The following data generally reflect the relatively small number of studies from community or primary care settings.

**TABLE 6.** Summary of Prevalence of Selected Coexisting Conditions in Children With ADHD

Comorbid Disorder	Estimated Prevalence (%)	Confidence Limits for Estimated Prevalence (%)
Oppositional defiant disorder	35.2	27.2, 43.8
Conduct disorder	25.7	12.8, 41.3
Anxiety disorder	25.8	17.6, 35.3
Depressive disorder	18.2	11.1, 26.6

Taken from: Green M, Wong M, Atkins D, et al. *Diagnosis of Attention Deficit/Hyperactivity Disorder. Technical Review 3*. Rockville, MD: US Dept of Health and Human Services. Agency for Health Care Policy and Research; 1999. AHCPR publication 99-0050

### *Conduct Disorder and Oppositional Defiant Disorder*

Oppositional defiant or conduct disorders coexist with ADHD in ~35% of children.<sup>24</sup> The diagnostic features of conduct disorder include “a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate social norms or rules are violated.”<sup>13</sup> Oppositional defiant disorder (a less severe condition) includes persistent symptoms of “negativistic, defiant, disobedient, and hostile behaviors toward authority figures.”<sup>13</sup> Frequently, children and adolescents with persisting oppositional defiant disorder later develop symptoms of sufficient severity to qualify for a diagnosis of conduct disorder. Longitudinal follow-up for children with conduct disorders that coexist with ADHD indicates that these children fare more poorly in adulthood relative to their peers diagnosed with ADHD alone.<sup>41</sup> For example, 1 study has reported the highest rates of police contacts and self-reported delinquency in children with ADHD and coexisting conduct disorder (30.8%) relative to their peers diagnosed with ADHD alone (3.4%) or conduct disorder alone (20.7%). Preliminary studies suggest that these coexisting conditions are more frequent in children with the predominantly hyperactive-impulsive and combined subtypes.<sup>25,26</sup>

### *Mood Disorders/Depression*

The coexistence of ADHD and mood disorders (eg, major depressive disorder and dysthymia) is ~18%.<sup>39</sup> Frequently, the family history of children with ADHD includes other family members with a history of major depressive disorder.<sup>42</sup> In addition, children who have coexisting ADHD and mood disorders also may have a poorer outcome during adolescence relative to their peers who do not have this pattern of co-occurrence.<sup>43</sup> For example, adolescents with coexisting mood disorders and ADHD are at increased risk for suicide attempts.<sup>44</sup> Preliminary studies suggest that these coexisting conditions are more frequent in children with the predominantly inattentive and combined subtypes.<sup>25,26</sup>

### *Anxiety*

The coexisting association between ADHD and anxiety disorders has been estimated to be ~25%.<sup>24</sup> In addition, the risk for anxiety disorders among relatives of children and adolescents diagnosed with ADHD is higher than for typically developing children, although some research suggests that ADHD and anxiety disorders transmit independently from families.<sup>45</sup> In either case, it is important to obtain a careful family history. Preliminary studies suggest that these coexisting conditions are more frequent in children with the predominantly inattentive and combined subtypes.<sup>25,26</sup>

### *Learning Disabilities*

Only 1 published study examined the coexistence of ADHD and learning disabilities in children evaluated in general pediatric settings using *DSM-IV* criteria for the diagnosis of ADHD.<sup>46</sup> The prevalence of learning disabilities as a coexisting condition can-

not be determined in the same manner as other psychological disorders because studies have employed dimensional (looking at the condition on a spectrum) rather than categorical diagnoses. Rates of learning disabilities that coexist with ADHD in settings other than primary care have been reported to range from 12% to 60%.<sup>24</sup>

To date, no definitive data describe the differences among groups of children with different learning disabilities coexisting with ADHD in the areas of sociodemographic characteristics, behavioral and emotional functioning, and response to various interventions. Nonetheless, the subgroup of children with learning disabilities, compared with their ADHD peers who do not have a learning disability, is most in need of special education services. Preliminary studies suggest that these coexisting conditions are more frequent in children with the predominantly inattentive and combined subtypes.<sup>25,26</sup>

**RECOMMENDATION 6: Other diagnostic tests are not routinely indicated to establish the diagnosis of ADHD (strength of evidence: strong; strength of recommendation: strong).**

Other diagnostic tests contribute little to establishing the diagnosis of ADHD. A few older studies have indicated associations between blood lead levels and child behavior symptoms, although most studies have not.<sup>47–49</sup> Although lead encephalopathy in younger children may predispose to later behavior and developmental problems, very few of these children will have elevated lead levels at school age. Thus, regular screening of children for high lead levels does not aid in the diagnosis of ADHD.

Studies have shown no significant associations between abnormal thyroid hormone levels and the presence of ADHD.<sup>50–52</sup> Children with the rare disorder of generalized resistance to thyroid hormone have higher rates of ADHD than other populations, but these children demonstrate other characteristics of that condition. This association does not argue for routine screening of thyroid function as part of the effort to diagnose ADHD.

Brain imaging studies and electroencephalography do not show reliable differences between children with ADHD and controls. Although some studies have demonstrated variation in brain morphology comparing children with and without ADHD, these findings do not discriminate reliably between children with and without this condition. In other words, although group means may differ significantly, the overlap in findings among children with and without ADHD creates high rates of false-positives and false-negatives.<sup>53–55</sup> Similarly, some studies have indicated higher rates of certain electroencephalogram abnormalities among children with ADHD,<sup>56–58</sup> but again the overlap between children with and without ADHD and the lack of consistent findings among multiple reports indicate that current literature do not support the routine use of electroencephalograms in the diagnosis of ADHD.

Continuous performance tests have been designed to obtain samples of a child's behavior (generally

measuring vigilance or distractibility), which may correlate with behaviors associated with ADHD. Several such tests have been developed and tested, but all of these have low odds ratios (all <1.2, equivalent to a sensitivity and specificity <70%) in studies differentiating children with ADHD from normal comparison controls.<sup>24,45,59,60</sup> Therefore, current data do not support the use of any available continuous performance tests in the diagnosis of ADHD.

#### AREAS FOR FUTURE RESEARCH

The research issues pertaining to the diagnosis of ADHD relate to the diagnostic criteria themselves as well as the methods used to establish the diagnosis. The *DSM-IV* has helped to define behavioral criteria for ADHD more specifically. Although research has established the dimensional concepts of inattention and hyperactivity-impulsivity, further research is required to validate these subtypes. Because most of the existing research has been conducted with referred convenience samples, primarily in psychiatric settings, further research is required to determine whether the findings of previous research are generalizable to the type of children currently diagnosed and treated by primary care clinicians. Although the current *DSM-IV* criteria are appropriate for the age range included in this guideline, there is, as yet, inadequate information about its applicability to individuals younger or older than the age range for this guideline. Further research should clarify the developmental course of ADHD symptomatology. An additional difficulty for primary care is that existing evidence indicates that the behaviors used in making a *DSM-IV* diagnosis of ADHD fall on a spectrum. Currently, decisions about the inappropriateness of the behaviors in children depend on subjective judgments of observers/reporters. There are no data to offer precise estimates of when diagnostic behaviors become inappropriate. This is particularly problematic to primary care clinicians, who care for a number of patients who fit into borderline or gray areas. The inadequacy of research on this aspect is central to the issue of which children should be diagnosed with ADHD and treated with stimulant medication. Further research using normative or community-based samples to develop more valid and precise diagnostic criteria is essential.

The diagnostic process is also an area requiring further research. Because no pathognomonic findings currently establish the diagnosis, further research should examine the utility of existing methods, with the goal of developing a more definitive process. Specific examples include the need for additional information about the reliability and validity of teacher and parent rating scales and the reliability and validity of different interviewing methods. Further, given the prominence of impairment in the current diagnostic requirements, it is imperative to develop and assess better measurements of impairment that can be applied practically in the primary care setting. The research into diagnostic methods also should include those methods helpful in identifying clinically relevant coexisting conditions.

Lastly, research is required to identify more clearly the current practices of primary care physicians beyond using self-report. Such research is critical in determining the practicality of guideline recommendations as a method to determine changes in practice and to determine whether changes have an actual impact on the treatment and outcome of children with the diagnosis of ADHD.

#### CONCLUSION

This guideline offers recommendations for the diagnosis and evaluation of school-aged children with ADHD in primary care practice. The guideline emphasizes: 1) the use of explicit criteria for the diagnosis using *DSM-IV* criteria; 2) the importance of obtaining information regarding the child's symptoms in more than 1 setting and especially from schools; and 3) the search for coexisting conditions that may make the diagnosis more difficult or complicate treatment planning. The guideline further provides current evidence regarding various diagnostic tests for ADHD. It should help primary care providers in their assessment of a common child health problem.

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