

## CLINICAL PRACTICE GUIDELINE

# ADHD: Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents

SUBCOMMITTEE ON ATTENTION-DEFICIT/HYPERACTIVITY DISORDER, STEERING COMMITTEE ON QUALITY IMPROVEMENT AND MANAGEMENT

**KEY WORDS**

attention-deficit/hyperactivity disorder, children, adolescents, preschool, behavioral therapy, medication

**ABBREVIATIONS**

AAP—American Academy of Pediatrics

ADHD—attention-deficit/hyperactivity disorder

DSM-PC—*Diagnostic and Statistical Manual for Primary Care*

CDC—Centers for Disease Control and Prevention

FDA—Food and Drug Administration

DSM-IV—*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*

MTA—Multimodal Therapy of ADHD

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## abstract



Attention-deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood and can profoundly affect the academic achievement, well-being, and social interactions of children; the American Academy of Pediatrics first published clinical recommendations for the diagnosis and evaluation of ADHD in children in 2000; recommendations for treatment followed in 2001. *Pediatrics* 2011;128:1007–1022

### Summary of key action statements:

1. The primary care clinician should initiate an evaluation for ADHD for any child 4 through 18 years of age who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity (quality of evidence B/strong recommendation).
2. To make a diagnosis of ADHD, the primary care clinician should determine that *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* criteria have been met (including documentation of impairment in more than 1 major setting); information should be obtained primarily from reports from parents or guardians, teachers, and other school and mental health clinicians involved in the child's care. The primary care clinician should also rule out any alternative cause (quality of evidence B/strong recommendation).
3. In the evaluation of a child for ADHD, the primary care clinician should include assessment for other conditions that might coexist with ADHD, including emotional or behavioral (eg, anxiety, depressive, oppositional defiant, and conduct disorders), developmental (eg, learning and language disorders or other neurodevelopmental disorders), and physical (eg, tics, sleep apnea) conditions (quality of evidence B/strong recommendation).
4. The primary care clinician should recognize ADHD as a chronic condition and, therefore, consider children and adolescents with ADHD as children and youth with special health care needs. Management of children and youth with special health care needs should follow the principles of the chronic care model and the medical home (quality of evidence B/strong recommendation).

5. Recommendations for treatment of children and youth with ADHD vary depending on the patient's age:

- a. For *preschool-aged children (4–5 years of age)*, the primary care clinician should prescribe evidence-based parent- and/or teacher-administered behavior therapy as the first line of treatment (quality of evidence A/strong recommendation) and may prescribe methylphenidate if the behavior interventions do not provide significant improvement and there is moderate-to-severe continuing disturbance in the child's function. In areas where evidence-based behavioral treatments are not available, the clinician needs to weigh the risks of starting medication at an early age against the harm of delaying diagnosis and treatment (quality of evidence B/recommendation).
- b. For *elementary school-aged children (6–11 years of age)*, the primary care clinician should prescribe US Food and Drug Administration–approved medications for ADHD (quality of evidence A/strong recommendation) and/or evidence-based parent- and/or teacher-administered behavior therapy as treatment for ADHD, preferably both (quality of evidence B/strong recommendation). The evidence is particularly strong for stimulant medications and sufficient but less strong for atomoxetine, extended-release guanfacine, and extended-release clonidine (in that order) (quality of evidence A/strong recommendation). The school environment, program, or placement is a part of any treatment plan.
- c. For *adolescents (12–18 years of age)*, the primary care clinician

should prescribe Food and Drug Administration–approved medications for ADHD with the assent of the adolescent (quality of evidence A/strong recommendation) and may prescribe behavior therapy as treatment for ADHD (quality of evidence C/recommendation), preferably both.

6. The primary care clinician should titrate doses of medication for ADHD to achieve maximum benefit with minimum adverse effects (quality of evidence B/strong recommendation).

## INTRODUCTION

This document updates and replaces 2 previously published clinical guidelines from the American Academy of Pediatrics (AAP) on the diagnosis and treatment of attention-deficit/hyperactivity disorder (ADHD) in children: “Clinical Practice Guideline: Diagnosis and Evaluation of the Child With Attention-Deficit/Hyperactivity Disorder” (2000)<sup>1</sup> and “Clinical Practice Guideline: Treatment of the School-aged Child With Attention-Deficit/Hyperactivity Disorder” (2001).<sup>2</sup> Since these guidelines were published, new information and evidence regarding the diagnosis and treatment of ADHD has become available. Surveys conducted before and after the publication of the previous guidelines have also provided insight into pediatricians' attitudes and practices regarding ADHD. On the basis of an increased understanding regarding ADHD and the challenges it raises for children and families and as a source for clinicians seeking to diagnose and treat children, this guideline pays particular attention to a number of areas.

## Expanded Age Range

The previous guidelines addressed diagnosis and treatment of ADHD in chil-

dren 6 through 12 years of age. There is now emerging evidence to expand the age range of the recommendations to include preschool-aged children and adolescents. This guideline addresses the diagnosis and treatment of ADHD in children 4 through 18 years of age, and attention is brought to special circumstances or concerns in particular age groups when appropriate.

## Expanded Scope

Behavioral interventions might help families of children with hyperactive/impulsive behaviors that do not meet full diagnostic criteria for ADHD. Guidance regarding the diagnosis of problem-level concerns in children based on the *Diagnostic and Statistical Manual for Primary Care (DSM-PC), Child and Adolescent Version*,<sup>3</sup> as well as suggestions for treatment and care of children and families with problem-level concerns, are provided here. The current DSM-PC was published in 1996 and, therefore, is not consistent with intervening changes to *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)*. Although this version of the DSM-PC should not be used as a definitive source for diagnostic codes related to ADHD and comorbid conditions, it certainly may continue to be used as a resource for enriching the understanding of ADHD manifestations. The DSM-PC will be revised when both the DSM-V and ICD-10 are available for use.

## A Process of Care for Diagnosis and Treatment

This guideline and process-of-care algorithm (see [Supplemental Fig 2](#) and [Supplemental Appendix](#)) recognizes evaluation, diagnosis, and treatment as a continuous process and provides recommendations for both the guideline and the algorithm in this single publication. In addition to the formal recommendations for assessment, diagnosis, and treatment, this guideline

provides a single algorithm to guide the clinical process.

### Integration With the Task Force on Mental Health

This guideline fits into the broader mission of the AAP Task Force on Mental Health and its efforts to provide a base from which primary care providers can develop alliances with families, work to prevent mental health conditions and identify them early, and collaborate with mental health clinicians.

The diagnosis and management of ADHD in children and youth has been particularly challenging for primary care clinicians because of the limited payment provided for what requires more time than most of the other conditions they typically address. The procedures recommended in this guideline necessitate spending more time with patients and families, developing a system of contacts with school and other personnel, and providing continuous, coordinated care, all of which is time demanding. In addition, relegating mental health conditions exclusively to mental health clinicians also is not a viable solution for many clinicians, because in many areas access to mental health clinicians to whom they can refer patients is limited. Access in many areas is also limited to psychologists when further assessment of cognitive issues is required and not available through the education system because of restrictions from third-party payers in paying for the evaluations on the basis of them being educational and not health related.

Cultural differences in the diagnosis and treatment of ADHD are an important issue, as they are for all pediatric conditions. Because the diagnosis and treatment of ADHD depends to a great extent on family and teacher perceptions, these issues might be even more prominent an issue for ADHD. Specific cultural issues

are beyond the scope of this guideline but are important to consider.

### METHODOLOGY

As with the 2 previously published clinical guidelines, the AAP collaborated with several organizations to develop a working subcommittee that represented a wide range of primary care and subspecialty groups. The subcommittee included primary care pediatricians, developmental-behavioral pediatricians, and representatives from the American Academy of Child and Adolescent Psychiatry, the Child Neurology Society, the Society for Pediatric Psychology, the National Association of School Psychologists, the Society for Developmental and Behavioral Pediatrics, the American Academy of Family Physicians, and Children and Adults With Attention-Deficit/Hyperactivity Disorder (CHADD), as well as an epidemiologist from the Centers for Disease Control and Prevention (CDC).

This group met over a 2-year period, during which it reviewed the changes in practice that have occurred and issues that have been identified since the previous guidelines were published. Delay in completing the process led to further conference calls and extended the years of literature reviewed in order to remain as current as possible. The AAP funded the development of this guideline; potential financial conflicts of the participants were identified and taken into consideration in the deliberations. The guideline will be reviewed and/or revised in 5 years unless new evidence emerges that warrants revision sooner.

The subcommittee developed a series of research questions to direct an extensive evidence-based review in partnership with the CDC and the University of Oklahoma Health Sciences Center. The diagnostic review was conducted by the CDC, and the evidence was evaluated in a combined effort of

the AAP, CDC, and University of Oklahoma Health Sciences Center staff. The treatment-related evidence relied on a recent evidence review by the Agency for Healthcare Research and Quality and was supplemented by evidence identified through the CDC review.

The diagnostic issues were focused on 5 areas:

1. ADHD prevalence—specifically: (a) What percentage of the general US population aged 21 years or younger has ADHD? (b) What percentage of patients presenting at pediatricians' or family physicians' offices in the United States meet diagnostic criteria for ADHD?
2. Co-occurring mental disorders—of people with ADHD, what percentage has 1 or more of the following co-occurring conditions: sleep disorders, learning disabilities, depression, anxiety, conduct disorder, and oppositional defiant disorder?
3. What are the functional impairments of children and youth diagnosed with ADHD? Specifically, in what domains and to what degree do youth with ADHD demonstrate impairments in functional domains, including peer relations, academic performance, adaptive skills, and family functioning?
4. Do behavior rating scales remain the standard of care in assessing the diagnostic criteria for ADHD?
5. What is the prevalence of abnormal findings on selected medical screening tests commonly recommended as standard components of an evaluation of a child with suspected ADHD? How accurate are these tests in the diagnosis of ADHD compared with a reference standard (ie, what are the psychometric properties of these tests)?

The treatment issues were focused on 3 areas:

1. What new information is available

regarding the long-term efficacy and safety of medications approved by the US Food and Drug Administration (FDA) for the treatment of ADHD (stimulants and nonstimulants), and specifically, what information is available about the efficacy and safety of these medications in preschool-aged and adolescent patients?

2. What evidence is available about the long-term efficacy and safety of psychosocial interventions (behavioral modification) for the treatment of ADHD for children, and specifically, what information is available about the efficacy and safety of these interventions in preschool-aged and adolescent patients?
3. Are there any additional therapies that reach the level of consideration as evidence based?

### **Evidence-Review Process for Diagnosis**

A multilevel, systematic approach was taken to identify the literature that built the evidence base for both diagnosis and treatment. To increase the likelihood that relevant articles were included in the final evidence base, the reviewers first conducted a scoping review of the literature by systematically searching literature using relevant key words and then summarized the primary findings of articles that met standard inclusion criteria. The reviewers then created evidence tables that were reviewed by content-area experts who were best able to identify articles that might have been missed through the scoping review. Articles that were missed were reviewed carefully to determine where the abstraction methodology failed, and adjustments to the search strategy were made as required (see technical report to be published). Finally, although published literature reviews did not contribute directly to the evidence

base, the articles included in review articles were cross-referenced with the final evidence tables to ensure that all relevant articles were included in the final evidence tables.

For the scoping review, articles were abstracted in a stratified fashion from 3 article-retrieval systems that provided access to articles in the domains of medicine, psychology, and education: PubMed ([www.ncbi.nlm.nih.gov/sites/entrez](http://www.ncbi.nlm.nih.gov/sites/entrez)), PsycINFO ([www.apa.org/pubs/databases/psycinfo/index.aspx](http://www.apa.org/pubs/databases/psycinfo/index.aspx)), and ERIC ([www.eric.ed.gov](http://www.eric.ed.gov)). English-language, peer-reviewed articles published between 1998 and 2009 were queried in the 3 search engines. Key words were selected with the intent of including all possible articles that might have been relevant to 1 or more of the questions of interest (see the technical report to be published). The primary abstraction included the following terms: “attention deficit hyperactivity disorder” or “attention deficit disorder” or “hyperkinesis” and “child.” A second, independent abstraction was conducted to identify articles related to medical screening tests for ADHD. For this abstraction, the same search terms were used as in the previous procedure along with the additional condition term “behavioral problems” to allow for the inclusion of studies of youth that sought to diagnose ADHD by using medical screening tests. Abstractions were conducted in parallel fashion across each of the 3 databases; the results from each abstraction (complete reference, abstract, and key words) were exported and compiled into a common reference database using EndNote 10.0.<sup>4</sup> References were subsequently and systematically deduplicated by using the software’s deduplication procedure. References for books, chapters, and theses were also deleted from the library. Once a deduplicated library was developed, the semifinal

database of 8267 references was reviewed for inclusion on the basis of inclusion criteria listed in the technical report. Included articles were then pulled in their entirety, the inclusion criteria were reconfirmed, and then the study findings were summarized in evidence tables. The articles included in relevant review articles were revisited to ensure their inclusion in the final evidence base. The evidence tables were then presented to the committee for expert review.

### **Evidence-Review Process for Treatment**

In addition to this systematic review, for treatment we used the review from the Agency for Healthcare Research and Quality (AHRQ) Effective Healthcare Program “Attention Deficit Hyperactivity Disorder: Effectiveness of Treatment in At-Risk Preschoolers; Long-term Effectiveness in All Ages; and Variability in Prevalence, Diagnosis, and Treatment.”<sup>5</sup> This review addressed a number of key questions for the committee, including the efficacy of medications and behavioral interventions for preschoolers, children, and adolescents. Evidence identified through the systematic evidence review for diagnosis was also used as a secondary data source to supplement the evidence presented in the AHRQ report. The draft practice guidelines were developed by consensus of the committee regarding the evidence. It was decided to create 2 separate components. The guideline recommendations were based on clear characterization of the evidence. The second component is a practice-of-care algorithm (see [Supplemental Fig 2](#)) that provides considerably more detail about how to implement the guidelines but is, necessarily, based less on available evidence and more on consensus of the committee members. When data were lacking, particularly in the



Evidence Quality	Preponderance of Benefit or Harm	Balance of Benefit and Harm
A. Well-designed RCTs or diagnostic studies on relevant population	Strong recommendation	Option
B. RCTs or diagnostic studies with minor limitations; overwhelmingly consistent evidence from observational studies	Recommendation	
C. Observational studies (case-control and cohort design)	Option	No Rec
D. Expert opinion, case reports, reasoning from first principles	Option	No Rec
X. Exceptional situations in which validating studies cannot be performed and there is a clear preponderance of benefit or harm	Strong recommendation	
	Recommendation	

**FIGURE 1**

Integrating evidence-quality appraisal with an assessment of the anticipated balance between benefits and harms if a policy is conducted leads to designation of a policy as a strong recommendation, recommendation, option, or no recommendation. The evidence is discussed in more detail in a technical report that will follow in a later publication. RCT indicates randomized controlled trial; Rec, recommendation.

process-of-care algorithmic portion of the guidelines, a combination of evidence and expert consensus was used. Action statements labeled “strong recommendation” or “recommendation” were based on high- to moderate-quality scientific evidence and a preponderance of benefit over harm.<sup>6</sup> Option-level action statements were based on lesser-quality or limited data and expert consensus or high-quality evidence with a balance between benefits and harms. These clinical options are interventions that a reasonable health care provider might or might not wish to implement in his or her practice. The quality of evidence supporting each recommendation and the strength of each recommendation were assessed by the committee member most experienced in epidemiology and graded according to AAP policy (Fig 1).<sup>6</sup>

The guidelines and process-of-care algorithm underwent extensive peer review by committees, sections, councils, and task forces within the AAP; numerous outside organizations; and other individuals identified by the subcommittee. Liaisons to the subcommittee also were invited to distribute the draft to entities within their organizations. The re-

sulting comments were compiled and reviewed by the chairperson, and relevant changes were incorporated into the draft, which was then reviewed by the full committee.

## ABOUT THIS GUIDELINE

### Key Action Statements

In light of the concerns highlighted previously and informed by the available evidence, the AAP has developed 6 action statements for the evaluation, diagnosis, and treatment of ADHD in children. These action statements provide for consistent and quality care for children and families with concerns about or symptoms that suggest attention disorders or problems.

### Context

This guideline is intended to be integrated with the broader algorithms developed as part of the mission of the AAP Task Force on Mental Health.<sup>7</sup>

### Implementation: A Process-of-Care Algorithm

The AAP recognizes the challenge of instituting practice changes and adopting new recommendations for care. To address the need, a process-of-care algorithm has been devel-

oped and has been used in the revision of the AAP ADHD toolkit.

### Implementation: Preparing the Practice

Full implementation of the action statements described in this guideline and the process-of-care algorithm might require changes in office procedures and/or preparatory efforts to identify community resources. The section titled “Preparing the Practice” in the process-of-care algorithm and further information can be found in the supplement to the Task Force on Mental Health report.<sup>7</sup> It is important to document all aspects of the diagnostic and treatment procedures in the patients’ records. Use of rating scales for the diagnosis of ADHD and assessment for comorbid conditions and as a method for monitoring treatment as described in the process algorithm (see [Supplemental Fig 2](#)), as well as information provided to parents such as management plans, can help facilitate a clinician’s accurate documentation of his or her process.

### Note

The AAP acknowledges that some primary care clinicians might not be confident of their ability to successfully diagnose and treat ADHD in a child because of the child’s age, co-existing conditions, or other concerns. At any point at which a clinician feels that he or she is not adequately trained or is uncertain about making a diagnosis or continuing with treatment, a referral to a pediatric or mental health subspecialist should be made. If a diagnosis of ADHD or other condition is made by a subspecialist, the primary care clinician should develop a management strategy with the subspecialist that ensures that the child will continue to receive appropriate care consistent with a medical home model wherein the pediatrician part-

ners with parents so that both health and mental health needs are integrated.

## KEY ACTION STATEMENTS FOR THE EVALUATION, DIAGNOSIS, TREATMENT, AND MONITORING OF ADHD IN CHILDREN AND ADOLESCENTS

**Action statement 1: The primary care clinician should initiate an evaluation for ADHD for any child 4 through 18 years of age who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity (quality of evidence B/strong recommendation).**

### Evidence Profile

- **Aggregate evidence quality:** B.
- **Benefits:** In a considerable number of children, ADHD goes undiagnosed. Primary care clinicians' systematic identification of children with these problems will likely decrease the rate of undiagnosed and untreated ADHD in children.
- **Harms/risks/costs:** Children in whom ADHD is inappropriately diagnosed might be labeled inappropriately, or another condition might be missed, and they might receive treatments that will not benefit them.
- **Benefits-harms assessment:** The high prevalence of ADHD and limited mental health resources require primary care pediatricians to play a significant role in the care of their patients with ADHD so that children with this condition receive the appropriate diagnosis and treatment. Treatments available have shown good evidence of efficacy, and lack of treatment results in a risk for impaired outcomes.
- **Value judgments:** The committee considered the requirements for establishing the diagnosis, the prevalence of ADHD, and the efficacy and adverse effects of treatment as well as the long-term outcomes.

- **Role of patient preferences:** Success with treatment depends on patient and family preference, which has to be taken into account.
- **Exclusions:** None.
- **Intentional vagueness:** The limits between what can be handled by a primary care clinician and what should be referred to a subspecialist because of the varying degrees of skills among primary care clinicians.
- **Strength: strong recommendation.**

The basis for this recommendation is essentially unchanged from that in the previous guideline. ADHD is the most common neurobehavioral disorder in children and occurs in approximately 8% of children and youth<sup>8-10</sup>; the number of children with this condition is far greater than can be managed by the mental health system. There is now increased evidence that appropriate diagnosis can be provided for preschool-aged children<sup>11</sup> (4–5 years of age) and for adolescents.<sup>12</sup>

**Action statement 2: To make a diagnosis of ADHD, the primary care clinician should determine that *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-TR)* criteria have been met (including documentation of impairment in more than 1 major setting), and information should be obtained primarily from reports from parents or guardians, teachers, and other school and mental health clinicians involved in the child's care. The primary care clinician should also rule out any alternative cause (quality of evidence B/strong recommendation).**

### Evidence Profile

- **Aggregate evidence quality:** B.
- **Benefits:** The use of DSM-IV criteria has led to more uniform categorization of the condition across professional disciplines.

- **Harms/risks/costs:** The DSM-IV system does not specifically provide for developmental-level differences and might lead to some misdiagnoses.
- **Benefits-harms assessment:** The benefits far outweigh the harm.
- **Value judgments:** The committee took into consideration the importance of coordination between pediatric and mental health services.
- **Role of patient preferences:** Although there is some stigma associated with mental disorder diagnoses resulting in some families preferring other diagnoses, the need for better clarity in diagnoses was felt to outweigh this preference.
- **Exclusions:** None.
- **Intentional vagueness:** None.
- **Strength: strong recommendation.**

As with the findings in the previous guideline, the DSM-IV criteria continue to be the criteria best supported by evidence and consensus. Developed through several iterations by the American Psychiatric Association, the DSM-IV criteria were created through use of consensus and an expanding research foundation.<sup>13</sup> The DSM-IV system is used by professionals in psychiatry, psychology, health care systems, and primary care. Use of DSM-IV criteria, in addition to having the best evidence to date for criteria for ADHD, also affords the best method for communication across clinicians and is established with third-party payers. The criteria are under review for the development of the DSM-V, but these changes will not be available until at least 1 year after the publication of this current guideline. The diagnostic criteria have not changed since the previous guideline and are presented in [Supplemental Table 2](#). An anticipated change in the DSM-V is increasing the age limit for when ADHD needs to have first presented from 7 to 12 years.<sup>14</sup>

### *Special Circumstances: Preschool-aged Children (4–5 Years Old)*

There is evidence that the diagnostic criteria for ADHD can be applied to preschool-aged children; however, the subtypes detailed in the DSM-IV might not be valid for this population.<sup>15–21</sup> A review of the literature, including the multisite study of the efficacy of methylphenidate in preschool-aged children, revealed that the criteria could appropriately identify children with the condition.<sup>11</sup> However, there are added challenges in determining the presence of key symptoms. Preschool-aged children are not likely to have a separate observer if they do not attend a preschool or child care program, and even if they do attend, staff in those programs might be less qualified than certified teachers to provide accurate observations. Here, too, focused checklists can help physicians in the diagnostic evaluation, although only the Conners Comprehensive Behavior Rating Scales and the ADHD Rating Scale IV are DSM-IV–based scales that have been validated in preschool-aged children.<sup>22</sup>

When there are concerns about the availability or quality of nonparent observations of a child's behavior, physicians may recommend that parents complete a parent-training program before confirming an ADHD diagnosis for preschool-aged children and consider placement in a qualified preschool program if they have not done so already. Information can be obtained from parents and teachers through the use of validated DSM-IV–based ADHD rating scales. The parent-training program must include helping parents develop age-appropriate developmental expectations and specific management skills for problem behaviors. The clinician may obtain reports from the parenting class instructor about the parents' ability to manage their children, and if the children are

in programs in which they are directly observed, instructors can report information about the core symptoms and function of the child directly. Qualified preschool programs include programs such as Head Start or other public prekindergarten programs. Preschool-aged children who display significant emotional or behavioral concerns might also qualify for Early Childhood Special Education services through their local school districts, and the evaluators for these programs and/or Early Childhood Special Education teachers might be excellent reporters of core symptoms.

### *Special Circumstances: Adolescents*

Obtaining teacher reports for adolescents might be more challenging, because many adolescents will have multiple teachers. Likewise, parents might have less opportunity to observe their adolescent's behaviors than they had when their children were younger. Adolescents' reports of their own behaviors often differ from those of other observers, because they tend to minimize their own problematic behaviors.<sup>23–25</sup> Adolescents are less likely to exhibit overt hyperactive behavior. Despite the difficulties, clinicians need to try to obtain (with agreement from the adolescent) information from at least 2 teachers as well as information from other sources such as coaches, school guidance counselors, or leaders of community activities in which the adolescent participates. In addition, it is unusual for adolescents with behavioral/attention problems not to have been previously given a diagnosis of ADHD. Therefore, it is important to establish the younger manifestations of the condition that were missed and to strongly consider substance use, depression, and anxiety as alternative or co-occurring diagnoses. Adolescents with ADHD, especially when untreated, are at greater risk of substance abuse.<sup>26</sup> In addition, the risks of

mood and anxiety disorders and risky sexual behaviors increase during adolescence.<sup>12</sup>

### *Special Circumstances: Inattention or Hyperactivity/Impulsivity (Problem Level)*

Teachers, parents, and child health professionals typically encounter children with behaviors relating to activity level, impulsivity, and inattention who might not fully meet DSM-IV criteria. The DSM-PC<sup>3</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 of less impairment than those specified in the DSM-IV.

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 problems in the areas of inattention, hyperactivity, or impulsivity. They do, however, provide guidance to clinicians regarding elements of treatment for children with problems with mild-to-moderate inattention, hyperactivity, or impulsivity. The DSM-PC also considers environmental influences on a child's behavior and provides information on differential diagnosis with a developmental perspective.

**Action statement 3: In the evaluation of a child for ADHD, the primary care clinician should include assessment for other conditions that might coexist with ADHD, including emotional or behavioral (eg, anxiety, depressive, oppositional defiant, and conduct disorders), developmental (eg, learning and language disorders or other neurodevelopmental disorders), and physical (eg, tics, sleep apnea) conditions (quality of evidence B/strong recommendation).**

## Evidence Profile

- **Aggregate evidence quality:** B.
- **Benefits:** Identifying coexisting conditions is important for developing the most appropriate treatment plan.
- **Harms/risks/costs:** The major risk is misdiagnosing the conditions and providing inappropriate care.
- **Benefits-harms assessment:** There is a preponderance of benefit over harm.
- **Value judgments:** The committee members took into consideration the common occurrence of coexisting conditions and the importance of addressing them in making this recommendation.
- **Role of patient preferences:** None.
- **Exclusions:** None.
- **Intentional vagueness:** None.
- **Strength: strong recommendation.**

A variety of other behavioral, developmental, and physical conditions can coexist in children who are evaluated for ADHD. These conditions include, but are not limited to, learning problems, language disorder, disruptive behavior, anxiety, mood disorders, tic disorders, seizures, developmental coordination disorder, or sleep disorders.<sup>23,24,27–38</sup> In some cases, the presence of a coexisting condition will alter the treatment of ADHD. The primary care clinician might benefit from additional support and guidance or might need to refer a child with ADHD and coexisting conditions, such as severe mood or anxiety disorders, to subspecialists for assessment and management. The subspecialists could include child psychiatrists, developmental-behavioral pediatricians, neurodevelopmental disability physicians, child neurologists, or child or school psychologists.

Given the likelihood that another condition exists, primary care clinicians should conduct assessments that determine or at least identify the risk of coexisting conditions. Through its Task Force on Mental

Health, the AAP has developed algorithms and a toolkit<sup>39</sup> for assessing and treating (or comanaging) the most common developmental disorders and mental health concerns in children. These resources might be useful in assessing children who are being evaluated for ADHD. Payment for evaluation and treatment must cover the fixed and variable costs of providing the services, as noted in the AAP policy statement “Scope of Health Care Benefits for Children From Birth Through Age 26.”<sup>40</sup>

### *Special Circumstances: Adolescents*

Clinicians should assess adolescent patients with newly diagnosed ADHD for symptoms and signs of substance abuse; when these signs and symptoms are found, evaluation and treatment for addiction should precede treatment for ADHD, if possible, or careful treatment for ADHD can begin if necessary.<sup>25</sup>

**Action statement 4: The primary care clinician should recognize ADHD as a chronic condition and, therefore, consider children and adolescents with ADHD as children and youth with special health care needs. Management of children and youth with special health care needs should follow the principles of the chronic care model and the medical home (quality of evidence B/strong recommendation).**

## Evidence Profile

- **Aggregate evidence quality:** B.
- **Benefits:** The recommendation describes the coordinated services most appropriate for managing the condition.
- **Harms/risks/costs:** Providing the services might be more costly.
- **Benefits-harms assessment:** There is a preponderance of benefit over harm.
- **Value judgments:** The committee members considered the value of medical

home services when deciding to make this recommendation.

- **Role of patient preferences:** Family preference in how these services are provided is an important consideration.
- **Exclusions:** None.
- **Intentional vagueness:** None.
- **Strength: strong recommendation.**

As in the previous guideline, this recommendation is based on the evidence that ADHD continues to cause symptoms and dysfunction in many children who have the condition over long periods of time, even into adulthood, and that the treatments available address symptoms and function but are usually not curative. Although the chronic illness model has not been specifically studied in children and youth with ADHD, it has been effective for other chronic conditions such as asthma,<sup>23</sup> and the medical home model has been accepted as the preferred standard of care.<sup>41</sup> The management process is also helped by encouraging strong family-school partnerships.<sup>42</sup>

Longitudinal studies have found that, frequently, treatments are not sustained despite the fact that long-term outcomes for children with ADHD indicate that they are at greater risk of significant problems if they discontinue treatment.<sup>43</sup> Because a number of parents of children with ADHD also have ADHD, extra support might be necessary to help those parents provide medication on a consistent basis and institute a consistent behavioral program. The medical home and chronic illness approach is provided in the process algorithm ([Supplemental Fig 2](#)). An important process in ongoing care is bidirectional communication with teachers and other school and mental health clinicians involved in the child’s care as well as with parents and patients.



*Special Circumstances: Inattention or Hyperactivity/Impulsivity (Problem Level)*

Children with inattention or hyperactivity/impulsivity at the problem level (DSM-PC) and their families might also benefit from the same chronic illness and medical home principles.

**Action statement 5: Recommendations for treatment of children and youth with ADHD vary depending on the patient's age.**

**Action statement 5a: For preschool-aged children (4–5 years of age), the primary care clinician should prescribe evidence-based parent- and/or teacher-administered behavior therapy as the first line of treatment (quality of evidence A/strong recommendation) and may prescribe methylphenidate if the behavior interventions do not provide significant improvement and there is moderate-to-severe continuing disturbance in the child's function. In areas in which evidence-based behavioral treatments are not available, the clinician needs to weigh the risks of starting medication at an early age against the harm of delaying diagnosis and treatment (quality of evidence B/recommendation).**

#### Evidence Profile

- **Aggregate evidence quality:** A for behavior; B for methylphenidate.
- **Benefits:** Both behavior therapy and methylphenidate have been demonstrated to reduce behaviors associated with ADHD and improve function.
- **Harms/risks/costs:** Both therapies increase the cost of care, and behavior therapy requires a higher level of family involvement, whereas methylphenidate has some potential adverse effects.
- **Benefits-harms assessment:** Given the risks of untreated ADHD, the benefits outweigh the risks.
- **Value judgments:** The committee mem-

bers included the effects of untreated ADHD when deciding to make this recommendation.

- **Role of patient preferences:** Family preference is essential in determining the treatment plan.
- **Exclusions:** None.
- **Intentional vagueness:** None.
- **Strength: strong recommendation.**

**Action statement 5b: For elementary school-aged children (6–11 years of age), the primary care clinician should prescribe FDA-approved medications for ADHD (quality of evidence A/strong recommendation) and/or evidence-based parent- and/or teacher-administered behavior therapy as treatment for ADHD, preferably both (quality of evidence B/strong recommendation). The evidence is particularly strong for stimulant medications and sufficient but less strong for atomoxetine, extended-release guanfacine, and extended-release clonidine (in that order) (quality of evidence A/strong recommendation). The school environment, program, or placement is a part of any treatment plan.**

#### Evidence Profile

- **Aggregate evidence quality:** A for treatment with FDA-approved medications; B for behavior therapy.
- **Benefits:** Both behavior therapy and FDA-approved medications have been demonstrated to reduce behaviors associated with ADHD and improve function.
- **Harms/risks/costs:** Both therapies increase the cost of care, and behavior therapy requires a higher level of family involvement, whereas FDA-approved medications have some potential adverse effects.
- **Benefits-harms assessment:** Given the risks of untreated ADHD, the benefits outweigh the risks.
- **Value judgments:** The committee members included the effects of untreated

ADHD when deciding to make this recommendation.

- **Role of patient preferences:** Family preference, including patient preference, is essential in determining the treatment plan.
- **Exclusions:** None.
- **Intentional vagueness:** None.
- **Strength: strong recommendation.**

**Action statement 5c: For adolescents (12–18 years of age), the primary care clinician should prescribe FDA-approved medications for ADHD with the assent of the adolescent (quality of evidence A/strong recommendation) and may prescribe behavior therapy as treatment for ADHD (quality of evidence C/recommendation), preferably both.**

#### Evidence Profile

- **Aggregate evidence quality:** A for medications; C for behavior therapy.
- **Benefits:** Both behavior therapy and FDA-approved medications have been demonstrated to reduce behaviors associated with ADHD and improve function.
- **Harms/risks/costs:** Both therapies increase the cost of care, and behavior therapy requires a higher level of family involvement, whereas FDA-approved medications have some potential adverse effects.
- **Benefits-harms assessment:** Given the risks of untreated ADHD, the benefits outweigh the risks.
- **Value judgments:** The committee members included the effects of untreated ADHD when deciding to make this recommendation.
- **Role of patient preferences:** Family preference, including patient preference, is essential in determining the treatment plan.
- **Exclusions:** None.
- **Intentional vagueness:** None.
- **Strength: strong recommendation/recommendation.**

## Medication

Similar to the recommendations from the previous guideline, stimulant medications are highly effective for most children in reducing core symptoms of ADHD.<sup>44</sup> One selective norepinephrine-reuptake inhibitor (atomoxetine<sup>45,46</sup>) and 2 selective  $\alpha_2$ -adrenergic agonists (extended-release guanfacine<sup>47,48</sup> and extended-release clonidine<sup>49</sup>) have also demonstrated efficacy in reducing core symptoms. Because norepinephrine-reuptake inhibitors and  $\alpha_2$ -adrenergic agonists are newer, the evidence base that supports them—although adequate for FDA approval—is considerably smaller than that for stimulants. None of them have been approved for use in preschool-aged children. Compared with stimulant medications that have an effect size [effect size = (treatment mean – control mean)/control SD] of approximately 1.0,<sup>50</sup> the effects of the nonstimulants are slightly weaker; atomoxetine has an effect size of approximately 0.7, and extended-release guanfacine and extended-release clonidine also have effect sizes of approximately 0.7.

The accompanying process-of-care algorithm provides a list of the currently available FDA-approved medications for ADHD (Supplemental Table 3). Characteristics of each medication are provided to help guide the clinician's choice in prescribing medication.

As was identified in the previous guideline, the most common stimulant adverse effects are appetite loss, abdominal pain, headaches, and sleep disturbance. The results of the Multimodal Therapy of ADHD (MTA) study revealed a more persistent effect of stimulants on decreasing growth velocity than have most previous studies, particularly when children were on higher and more consistently administered doses. The effects diminished by the third year of treatment, but no com-

pensatory rebound effects were found.<sup>51</sup> However, diminished growth was in the range of 1 to 2 cm. An uncommon additional significant adverse effect of stimulants is the occurrence of hallucinations and other psychotic symptoms.<sup>52</sup> Although concerns have been raised about the rare occurrence of sudden cardiac death among children using stimulant medications,<sup>53</sup> sudden death in children on stimulant medication is extremely rare, and evidence is conflicting as to whether stimulant medications increase the risk of sudden death.<sup>54–56</sup> It is important to expand the history to include specific cardiac symptoms, Wolf-Parkinson-White syndrome, sudden death in the family, hypertrophic cardiomyopathy, and long QT syndrome. Preschool-aged children might experience increased mood lability and dysphoria.<sup>57</sup> For the nonstimulant atomoxetine, the adverse effects include initial somnolence and gastrointestinal tract symptoms, particularly if the dosage is increased too rapidly; decrease in appetite; increase in suicidal thoughts (less common); and hepatitis (rare). For the nonstimulant  $\alpha_2$ -adrenergic agonists extended-release guanfacine and extended-release clonidine, adverse effects include somnolence and dry mouth.

Only 2 medications have evidence to support their use as adjunctive therapy with stimulant medications sufficient to achieve FDA approval: extended-release guanfacine<sup>26</sup> and extended-release clonidine. Other medications have been used in combination off-label, but there is currently only anecdotal evidence for their safety or efficacy, so their use cannot be recommended at this time.

### *Special Circumstances: Preschool-aged Children*

A number of special circumstances support the recommendation to initi-

ate ADHD treatment in preschool-aged children (ages 4–5 years) with behavioral therapy alone first.<sup>57</sup> These circumstances include:

- The multisite study of methylphenidate<sup>57</sup> was limited to preschool-aged children who had moderate-to-severe dysfunction.
- The study also found that many children (ages 4–5 years) experience improvements in symptoms with behavior therapy alone, and the overall evidence for behavior therapy in preschool-aged children is strong.
- Behavioral programs for children 4 to 5 years of age typically run in the form of group parent-training programs and, although not always compensated by health insurance, have a lower cost. The process algorithm (see Supplemental pages s15–16) contains criteria for the clinician to use in assessing the quality of the behavioral therapy. In addition, programs such as Head Start and Children and Adults With Attention Deficit Hyperactivity Disorder (CHADD) ([www.chadd.org](http://www.chadd.org)) might provide some behavioral supports.

Many young children with ADHD might still require medication to achieve maximum improvement, and medication is not contraindicated for children 4 through 5 years of age. However, only 1 multisite study has carefully assessed medication use in preschool-aged children. Other considerations in the recommendation about treating children 4 to 5 years of age with stimulant medications include:

- The study was limited to preschool-aged children who had moderate-to-severe dysfunction.
- Research has found that a number of young children (4–5 years of age) experience improvements in symptoms with behavior therapy alone.
- There are concerns about the possi-

ble effects on growth during this rapid growth period of preschool-aged children.

- There has been limited information about and experience with the effects of stimulant medication in children between the ages of 4 and 5 years.

Here, the criteria for enrollment (and, therefore, medication use) included measures of severity that distinguished treated children from the larger group of preschool-aged children with ADHD. Thus, before initiating medications, the physician should assess the severity of the child's ADHD. Given current data, only those preschool-aged children with ADHD who have moderate-to-severe dysfunction should be considered for medication. Criteria for this level of severity, based on the multisite-study results,<sup>57</sup> are (1) symptoms that have persisted for at least 9 months, (2) dysfunction that is manifested in both the home and other settings such as preschool or child care, and (3) dysfunction that has not responded adequately to behavior therapy. The decision to consider initiating medication at this age depends in part on the clinician's assessment of the estimated developmental impairment, safety risks, or consequences for school or social participation that could ensue if medications are not initiated. It is often helpful to consult with a mental health specialist who has had specific experience with preschool-aged children if possible.

Dextroamphetamine is the only medication approved by the FDA for use in children younger than 6 years of age. This approval, however, was based on less stringent criteria in force when the medication was approved rather than on empirical evidence of its safety and efficacy in this age group. Most of the evidence for the safety and efficacy of treating preschool-aged children with stimulant medications has been

from methylphenidate.<sup>57</sup> Methylphenidate evidence consists of 1 multisite study of 165 children and 10 other smaller single-site studies that included from 11 to 59 children (total of 269 children); 7 of the 10 single-site studies found significant efficacy. It must be noted that although there is moderate evidence that methylphenidate is safe and efficacious in preschool-aged children, its use in this age group remains off-label. Although the use of dextroamphetamine is on-label, the insufficient evidence for its safety and efficacy in this age group does not make it possible to recommend at this time.

If children do not experience adequate symptom improvement with behavior therapy, medication can be prescribed, as described previously. Evidence suggests that the rate of metabolizing stimulant medication is slower in children 4 through 5 years of age, so they should be given a lower dose to start, and the dose can be increased in smaller increments. Maximum doses have not been adequately studied.<sup>57</sup>

#### *Special Circumstances: Adolescents*

As noted previously, before beginning medication treatment for adolescents with newly diagnosed ADHD, clinicians should assess these patients for symptoms of substance abuse. When substance use is identified, assessment when off the abusive substances should precede treatment for ADHD (see the Task Force on Mental Health report<sup>7</sup>). Diversion of ADHD medication (use for other than its intended medical purposes) is also a special concern among adolescents<sup>58</sup>; clinicians should monitor symptoms and prescription-refill requests for signs of misuse or diversion of ADHD medication and consider prescribing medications with no abuse potential, such as atomoxetine (Strattera [Ely Lilly Co, Indianapolis, IN]) and

extended-release guanfacine (Intuniv [Shire US Inc, Wayne, PA]) or extended-release clonidine (Kapvay [Shionogi Inc, Florham Park, NJ]) (which are not stimulants) or stimulant medications with less abuse potential, such as lisdexamfetamine (Vyvanse [Shire US Inc]), dermal methylphenidate (Daytrana [Noven Therapeutics, LLC, Miami, FL]), or OROS methylphenidate (Concerta [Janssen Pharmaceuticals, Inc, Titusville, NJ]). Because lisdexamfetamine is dextroamphetamine, which contains an additional lysine molecule, it is only activated after ingestion, when it is metabolized by erythrocyte cells to dexamphetamine. The other preparations make extraction of the stimulant medication more difficult.

Given the inherent risks of driving by adolescents with ADHD, special concern should be taken to provide medication coverage for symptom control while driving. Longer-acting or late-afternoon, short-acting medications might be helpful in this regard.<sup>59</sup>

#### *Special Circumstances: Inattention or Hyperactivity/Impulsivity (Problem Level)*

Medication is not appropriate for children whose symptoms do not meet DSM-IV criteria for diagnosis of ADHD, although behavior therapy does not require a specific diagnosis, and many of the efficacy studies have included children without specific mental behavioral disorders.

#### **Behavior Therapy**

Behavior therapy represents a broad set of specific interventions that have a common goal of modifying the physical and social environment to alter or change behavior. Behavior therapy usually is implemented by training parents in specific techniques that improve their abilities to modify and

**TABLE 1** Evidence-Based Behavioral Treatments for ADHD

Intervention Type	Description	Typical Outcome(s)	Median Effect Size <sup>a</sup>
Behavioral parent training (BPT)	Behavior-modification principles provided to parents for implementation in home settings	Improved compliance with parental commands; improved parental understanding of behavioral principles; high levels of parental satisfaction with treatment	0.55
Behavioral classroom management	Behavior-modification principles provided to teachers for implementation in classroom settings	Improved attention to instruction; improved compliance with classroom rules; decreased disruptive behavior; improved work productivity	0.61
Behavioral peer interventions (BPI) <sup>b</sup>	Interventions focused on peer interactions/relationships; these are often group-based interventions provided weekly and include clinic-based social-skills training used either alone or concurrently with behavioral parent training and/or medication	Office-based interventions have produced minimal effects; interventions have been of questionable social validity; some studies of BPI combined with clinic-based BPT found positive effects on parent ratings of ADHD symptoms; no differences on social functioning or parent ratings of social behavior have been revealed	

<sup>a</sup> Effect size = (treatment median — control median)/control SD.

<sup>b</sup> The effect size for behavioral peer interventions is not reported, because the effect sizes for these studies represent outcomes associated with combined interventions. A lower effect size means that they have less of an effect. The effect sizes found are considered moderate.

Adapted from Pelham W, Fabiano GA. *J Clin Child Adolesc Psychol.* 2008;37(1):184–214.

shape their child's behavior and to improve the child's ability to regulate his or her own behavior. The training involves techniques to more effectively provide rewards when their child demonstrates the desired behavior (eg, positive reinforcement), learn what behaviors can be reduced or eliminated by using planned ignoring as an active strategy (or using praising and ignoring in combination), or provide appropriate consequences or punishments when their child fails to meet the goals (eg, punishment). There is a need to consistently apply rewards and consequences as tasks are achieved and then to gradually increase the expectations for each task as they are mastered to shape behaviors. Although behavior therapy shares a set of principles, individual programs introduce different techniques and strategies to achieve the same ends.

Table 1 lists the major behavioral intervention approaches that have been demonstrated to be evidence based for the management of ADHD in 3 different types of settings. The table is based on 22 studies, each completed between 1997 and 2006.

Evidence for the effectiveness of behavior therapy in children with ADHD is

derived from a variety of studies<sup>60–62</sup> and an Agency for Healthcare Research and Quality review.<sup>5</sup> The diversity of interventions and outcome measures makes meta-analysis of the effects of behavior therapy alone or in association with medications challenging. The long-term positive effects of behavior therapy have yet to be determined. Ongoing adherence to a behavior program might be important; therefore, implementing a chronic care model for child health might contribute to the long-term effects.<sup>63</sup>

Study results have indicated positive effects of behavior therapy when combined with medications. Most studies that compared behavior therapy to stimulants found a much stronger effect on ADHD core symptoms from stimulants than from behavior therapy. The MTA study found that combined treatment (behavior therapy and stimulant medication) was not significantly more efficacious than treatment with medication alone for the core symptoms of ADHD after correction for multiple tests in the primary analysis.<sup>64</sup> However, a secondary analysis of a combined measure of parent and teacher ratings of ADHD symptoms revealed a significant advantage

for the combination with a small effect size of  $d = 0.26$ .<sup>65</sup> However, the same study also found that the combined treatment compared with medication alone did offer greater improvements on academic and conduct measures when ADHD coexisted with anxiety and when children lived in low socioeconomic environments. In addition, parents and teachers of children who were receiving combined therapy were significantly more satisfied with the treatment plan. Finally, the combination of medication management and behavior therapy allowed for the use of lower dosages of stimulants, which possibly reduced the risk of adverse effects.<sup>66</sup>

### School Programming and Supports

Behavior therapy programs coordinating efforts at school as well as home might enhance the effects. School programs can provide classroom adaptations, such as preferred seating, modified work assignments, and test modifications (to the location at which it is administered and time allotted for taking the test), as well as behavior plans as part of a 504 Rehabilitation Act Plan or special education Individualized Education Program (IEP) under the "other health impairment" designation as part of the Individuals With



Disability Education Act (IDEA).<sup>67</sup> It is helpful for clinicians to be aware of the eligibility criteria in their state and school district to advise families of their options. Youths documented to have ADHD can also get permission to take college-readiness tests in an untimed manner by following appropriate documentation guidelines.<sup>68</sup>

The effect of coexisting conditions on ADHD treatment is variable. In some cases, treatment of the ADHD resolves the coexisting condition. For example, treatment of ADHD might resolve oppositional defiant disorder or anxiety.<sup>68</sup> However, sometimes the co-occurring condition might require treatment that is in addition to the treatment for ADHD. Some coexisting conditions can be treated in the primary care setting, but others will require referral and co-management with a subspecialist.

**Action statement 6: Primary care clinicians should titrate doses of medication for ADHD to achieve maximum benefit with minimum adverse effects (quality of evidence B/strong recommendation).**

### Evidence Profile

- **Aggregate evidence quality:** B.
- **Benefits:** The optimal dose of medication is required to reduce core symptoms to or as close to the levels of children without ADHD.
- **Harms/risks/costs:** Higher levels of medication increase the chances of adverse effects.
- **Benefits-harms assessment:** The importance of adequately treating ADHD outweighs the risk of adverse effects.
- **Value judgments:** The committee members included the effects of untreated ADHD when deciding to make this recommendation.
- **Role of patient preferences:** The families' preferences and comfort need to be taken into consideration in developing a titration plan.
- **Exclusions:** None.

- **Intentional vagueness:** None.
- **Strength: strong recommendation.**

The findings from the MTA study suggested that more than 70% of children and youth with ADHD respond to one of the stimulant medications at an optimal dose when a systematic trial is used.<sup>65</sup> Children in the MTA who were treated in the community with care as usual from whomever they chose or to whom they had access received lower doses of stimulants with less frequent monitoring and had less optimal results.<sup>65</sup> Because stimulants might produce positive but suboptimal effects at a low dose in some children and youth, titration to maximum doses that control symptoms without adverse effects is recommended instead of titration strictly on a milligram-per-kilogram basis.

Education of parents is an important component in the chronic illness model to ensure their cooperation in efforts to reach appropriate titration (remembering that the parents themselves might be challenged significantly by ADHD).<sup>69,70</sup> The primary care clinician should alert parents and children that changing medication dose and occasionally changing a medication might be necessary for optimal medication management, that the process might require a few months to achieve optimal success, and that medication efficacy should be systematically monitored at regular intervals.

Because stimulant medication effects are seen immediately, trials of different doses of stimulants can be accomplished in a relatively short time period. Stimulant medications can be effectively titrated on a 3- to 7-day basis.<sup>65</sup>

It is important to note that by the 3-year follow-up of 14-month MTA interventions (optimal medications management, optimal behavioral management, the combination of the 2, or community treatment), all differences among the initial 4

groups were no longer present. After the initial 14-month intervention, the children no longer received the careful monthly monitoring provided by the study and went back to receiving care from their community providers. Their medications and doses varied, and a number of them were no longer taking medication. In children still on medication, the growth deceleration was only seen for the first 2 years and was in the range of 1 to 2 cm.

### CONCLUSION

Evidence continues to be fairly clear with regard to the legitimacy of the diagnosis of ADHD and the appropriate diagnostic criteria and procedures required to establish a diagnosis, identify co-occurring conditions, and treat effectively with both behavioral and pharmacologic interventions. However, the steps required to sustain appropriate treatments and achieve successful long-term outcomes still remain a challenge. To provide more detailed information about how the recommendations of this guideline can be accomplished, a more detailed but less strongly evidence-based algorithm is provided as a companion article.

### AREAS FOR FUTURE RESEARCH

Some specific research topics pertinent to the diagnosis and treatment of ADHD or developmental variations or problems in children and adolescents in primary care to be explored include:

- identification or development of reliable instruments suitable to use in primary care to assess the nature or degree of functional impairment in children/adolescents with ADHD and monitor improvement over time;
- study of medications and other therapies used clinically but not approved by the FDA for ADHD, such as

electroencephalographic biofeedback;

- determination of the optimal schedule for monitoring children/adolescents with ADHD, including factors for adjusting that schedule according to age, symptom severity, and progress reports;
- evaluation of the effectiveness of various school-based interventions;
- comparisons of medication use and effectiveness in different ages, including both harms and benefits;
- development of methods to involve parents and children/adolescents in their own care and improve adherence to both behavior and medication treatments;
- standardized and documented tools that will help primary care providers in identifying coexisting conditions;
- development and determination of effective electronic and Web-based systems to help gather information to diagnose and monitor children with ADHD;
- improved systems of communication with schools and mental health professionals, as well as other community agencies, to provide effective collaborative care;
- evidence for optimal monitoring by

some aspects of severity, disability, or impairment; and

- long-term outcomes of children first identified with ADHD as preschool-aged children.

#### **SUBCOMMITTEE ON ATTENTION DEFICIT HYPERACTIVITY DISORDER (OVERSIGHT BY THE STEERING COMMITTEE ON QUALITY IMPROVEMENT AND MANAGEMENT, 2005–2011)**

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#### **REFERENCES**

1. American Academy of Pediatrics, Committee on Quality Improvement and Subcommittee on Attention-Deficit/Hyperactivity Disorder. Clinical practice guideline: diagnosis and evaluation of the child with attention-deficit/hyperactivity disorder. *Pediatrics*. 2000;105(5):1158–1170
2. American Academy of Pediatrics, Subcommittee on Attention-Deficit/Hyperactivity Disorder, Committee on Quality Improvement. Clinical practice guideline: treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics*. 2001;108(4):1033–1044
3. Wolraich ML, Felice ME, Drotar DD. *The Classification of Child and Adolescent Mental Conditions in Primary Care: Diagnostic and Statistical Manual for Primary Care (DSM-PC), Child and Adolescent Version*. Elk Grove, IL: American Academy of Pediatrics; 1996
4. *EndNote* [computer program]. 10th ed. Carlsbad, CA: Thompson Reuters; 2009
5. Charach A, Dashti B, Carson P, Booker L, Lim CG, Lillie E, Yeung E, Ma J, Raina P, Schachar R. *Attention Deficit Hyperactivity Disorder: Effectiveness of Treatment in At-Risk Preschoolers; Long-term Effectiveness in All Ages; and Variability in Prevalence, Diagnosis, and Treatment*. Comparative Effectiveness Review No. 44. (Prepared by the McMaster University Evidence-based Practice Center under Contract No. MME2202 290-02-0020.)
6. AHRQ Publication No. 12-EHC003-EF. Rockville, MD: Agency for Healthcare Research and Quality. October 2011.
7. American Academy of Pediatrics, Steering Committee on Quality Improvement. Classifying recommendations for clinical practice guidelines. *Pediatrics*. 2004;114(3):874–877
8. Foy JM; American Academy of Pediatrics Task Force on Mental Health. Enhancing pediatric mental health care: report from the American Academy of Pediatrics Task Force on Mental Health. Introduction. *Pediatrics*. 2010;125(suppl 3):S69–S174
9. Visser SN, Lesesne CA, Perou R. National estimates and factors associated with medication treatment for childhood

- attention-deficit/hyperactivity disorder. *Pediatrics*. 2007;119(suppl 1):S99–S106
9. Centers for Disease Control and Prevention. Mental health in the United States: prevalence of diagnosis and medication treatment for attention-deficit/hyperactivity disorder—United States, 2003. *MMWR Morb Mortal Wkly Rep*. 2005; 54(34):842–847
  10. Centers for Disease Control and Prevention. Increasing prevalence of parent-reported attention deficit/hyperactivity disorder among children: United States, 2003–2007. *MMWR Morb Mortal Wkly Rep*. 2010;59(44): 1439–1443
  11. Egger HL, Kondo D, Angold A. The epidemiology and diagnostic issues in preschool attention-deficit/hyperactivity disorder. *Infant Young Child*. 2006;19(2):109–122
  12. Wolraich ML, Wibbelsman CJ, Brown TE, et al. Attention-deficit/hyperactivity disorder among adolescents: a review of the diagnosis, treatment, and clinical implications. *Pediatrics*. 2005;115(6):1734–1746
  13. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, 4th ed, Text Revision (DSM-IV-TR)*. Washington, DC: American Psychiatric Association; 2000
  14. American Psychiatric Association. Diagnostic criteria for attention deficit/hyperactivity disorder. Available at: [www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=383](http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=383). Accessed September 30, 2011
  15. Lahey BB, Pelham WE, Stein MA, et al. Validity of DSM-IV attention-deficit/hyperactivity disorder for younger children [published correction appears in *J Am Acad Child Adolesc Psychiatry*. 1999;38(2):222]. *J Am Acad Child Adolesc Psychiatry*. 1998;37(7):695–702
  16. Pavuluri MN, Luk SL, McGee R. Parent reported preschool attention deficit hyperactivity: measurement and validity. *Eur Child Adolesc Psychiatry*. 1999;8(2): 126–133
  17. Harvey EA, Youngwirth SD, Thakar DA, Errazuriz PA. Predicting attention-deficit/hyperactivity disorder and oppositional defiant disorder from preschool diagnostic assessments. *J Consult Clin Psychol*. 2009; 77(2):349–354
  18. Keenan K, Wakschlag LS. More than the terrible twos: the nature and severity of behavior problems in clinic-referred preschool children. *J Abnorm Child Psychol*. 2000; 28(1):33–46
  19. Gadow KD, Nolan EE, Litcher L, et al. Comparison of attention-deficit/hyperactivity disorder symptoms subtypes in Ukrainian schoolchildren. *J Am Acad Child Adolesc Psychiatry*. 2000;39(12):1520–1527
  20. Sprafkin J, Volpe RJ, Gadow KD, Nolan EE, Kelly K. A DSM-IV-referenced screening instrument for preschool children: the Early Childhood Inventory-4. *J Am Acad Child Adolesc Psychiatry*. 2002;41(5): 604–612
  21. Poblano A, Romero E. ECI-4 screening of attention deficit-hyperactivity disorder and co-morbidity in Mexican preschool children: preliminary results. *Arq Neuropsiquiatr*. 2006;64(4):932–936
  22. McGoey KE, DuPaul GJ, Haley E, Shelton TL. Parent and teacher ratings of attention-deficit/hyperactivity disorder in preschool: the ADHD Rating Scale-IV Preschool Version. *J Psychopathol Behav Assess*. 2007;29(4): 269–276
  23. Young J. Common comorbidities seen in adolescents with attention-deficit/hyperactivity disorder. *Adolesc Med State Art Rev*. 2008;19(2): 216–228, vii
  24. Freeman R; Tourette Syndrome International Database Consortium. Tic disorders and ADHD: answers from a worldwide clinical dataset on Tourette syndrome [published correction appears in *Eur Child Adolesc Psychiatry*. 2007; 16(8):536]. *Eur Child Adolesc Psychiatry*. 2007;16(1 suppl):15–23
  25. Riggs P. Clinical approach to treatment of ADHD in adolescents with substance use disorders and conduct disorder. *J Am Acad Child Adolesc Psychiatry*. 1998;37(3): 331–332
  26. Kratochvil CJ, Vaughan BS, Stoner JA, et al. A double-blind, placebo-controlled study of atomoxetine in young children with ADHD. *Pediatrics*. 2011;127(4). Available at: [www.pediatrics.org/cgi/content/full/127/4/e862](http://www.pediatrics.org/cgi/content/full/127/4/e862)
  27. Rowland AS, Lesesne CA, Abramowitz AJ. The epidemiology of attention-deficit/hyperactivity disorder (ADHD): a public health view. *Ment Retard Dev Disabil Res Rev*. 2002;8(3):162–170
  28. Cuffe SP, Moore CG, McKeown RE. Prevalence and correlates of ADHD symptoms in the national health interview survey. *J Atten Disord*. 2005;9(2):392–401
  29. Pastor PN, Reuben CA. Diagnosed attention deficit hyperactivity disorder and learning disability: United States, 2004–2006. *Vital Health Stat 10*. 2008;(237):1–14
  30. Biederman J, Faraone SV, Wozniak J, Mick E, Kwon A, Aleardi M. Further evidence of unique developmental phenotypic correlates of pediatric bipolar disorder: findings from a large sample of clinically referred preadolescent children assessed over the last 7 years. *J Affect Disord*. 2004;82(suppl 1):S45–S58
  31. Biederman J, Kwon A, Aleardi M. Absence of gender effects on attention deficit hyperactivity disorder: findings in nonreferred subjects. *Am J Psychiatry*. 2005;162(6): 1083–1089
  32. Biederman J, Ball SW, Monuteaux MC, et al. New insights into the comorbidity between ADHD and major depression in adolescent and young adult females. *J Am Acad Child Adolesc Psychiatry*. 2008; 47(4):426–434
  33. Biederman J, Melmed RD, Patel A, McBurnett K, Donahue J, Lyne A. Long-term, open-label extension study of guanfacine extended release in children and adolescents with ADHD. *CNS Spectr*. 2008;13(12): 1047–1055
  34. Crabtree VM, Ivanenko A, Gozal D. Clinical and parental assessment of sleep in children with attention-deficit/hyperactivity disorder referred to a pediatric sleep medicine center. *Clin Pediatr (Phila)*. 2003;42(9): 807–813
  35. LeBourgeois MK, Avis K, Mixon M, Olmi J, Harsh J. Snoring, sleep quality, and sleepiness across attention-deficit/hyperactivity disorder subtypes. *Sleep*. 2004;27(3): 520–525
  36. Chan E, Zhan C, Homer CJ. Health care use and costs for children with attention-deficit/hyperactivity disorder: national estimates from the medical expenditure panel survey. *Arch Pediatr Adolesc Med*. 2002; 156(5):504–511
  37. Newcorn JH, Miller SR, Ivanova I, et al. Adolescent outcome of ADHD: impact of childhood conduct and anxiety disorders. *CNS Spectr*. 2004;9(9):668–678
  38. Sung V, Hiscock H, Sciberras E, Efron D. Sleep problems in children with attention-deficit/hyperactivity disorder: prevalence and the effect on the child and family. *Arch Pediatr Adolesc Med*. 2008; 162(4):336–342
  39. American Academy of Pediatrics, Task Force on Mental Health. *Addressing Mental Health Concerns in Primary Care: A Clinician's Toolkit* [CD-ROM]. Elk Grove Village, IL: American Academy of Pediatrics; 2010
  40. American Academy of Pediatrics, Committee on Child Health Financing. Scope of health care benefits for children from birth through age 26. *Pediatrics*. 2012; In press
  41. Brito A, Grant R, Overholt S, et al. The enhanced medical home: the pediatric standard of care for medically underserved children. *Adv Pediatr*. 2008;55:9–28



42. Homer C, Klatka K, Romm D, et al. A review of the evidence for the medical home for children with special health care needs. *Pediatrics*. 2008;122(4). Available at: [www.pediatrics.org/cgi/content/full/122/4/e922](http://www.pediatrics.org/cgi/content/full/122/4/e922)
43. Ingram S, Hechtman L, Morgenstern G. Outcome issues in ADHD: adolescent and adult long-term outcome. *Ment Retard Dev Disabil Res Rev*. 1999;5(3):243–250
44. Barbaresi WJ, Katusic SK, Colligan RC, Weaver AL, Jacobsen SJ. Modifiers of long-term school outcomes for children with attention-deficit/hyperactivity disorder: does treatment with stimulant medication make a difference? Results from a population-based study. *J Dev Behav Pediatr*. 2007;28(4):274–287
45. Cheng JY, Cheng RY, Ko JS, Ng EM. Efficacy and safety of atomoxetine for attention-deficit/hyperactivity disorder in children and adolescents-meta-analysis and meta-regression analysis. *Psychopharmacology*. 2007;194(2):197–209
46. Michelson D, Allen AJ, Busner J, Casat C, Dunn D, Kratochvil CJ. Once daily atomoxetine treatment for children and adolescents with ADHD: a randomized, placebo-controlled study. *Am J Psychiatry*. 2002;159(11):1896–1901
47. Biederman J, Melmed RD, Patel A, et al; SPD503 Study Group. A randomized, double-blind, placebo-controlled study of guanfacine extended release in children and adolescents with attention-deficit/hyperactivity disorder. *Pediatrics*. 2008;121(1). Available at: [www.pediatrics.org/cgi/content/full/121/1/e73](http://www.pediatrics.org/cgi/content/full/121/1/e73)
48. Sallee FR, Lyne A, Wigal T, McGough JJ. Long-term safety and efficacy of guanfacine extended release in children and adolescents with attention-deficit/hyperactivity disorder. *J Child Adolesc Psychopharmacol*. 2009;19(3):215–226
49. Jain R, Segal S, Kollins SH, Khayrallah M. Clonidine extended-release tablets for pediatric patients with attention-deficit/hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry*. 2011;50(2):171–179
50. Newcorn J, Kratochvil CJ, Allen AJ, et al. Atomoxetine and osmotically released methylphenidate for the treatment of attention deficit hyperactivity disorder: acute comparison and differential response. *Am J Psychiatry*. 2008;165(6):721–730
51. Swanson J, Elliott GR, Greenhill LL, et al. Effects of stimulant medication on growth rates across 3 years in the MTA follow-up. *J Am Acad Child Adolesc Psychiatry*. 2007;46(8):1015–1027
52. Mosholder AD, Gelperin K, Hammad TA, Phelan K, Johann-Liang R. Hallucinations and other psychotic symptoms associated with the use of attention-deficit/hyperactivity disorder drugs in children. *Pediatrics*. 2009;123(2):611–616
53. Avigan M. *Review of AERS Data From Marketed Safety Experience During Stimulant Therapy: Death, Sudden Death, Cardiovascular SAEs (Including Stroke)*. Silver Spring, MD: Food and Drug Administration, Center for Drug Evaluation and Research; 2004. Report No. D030403
54. Perrin JM, Friedman RA, Knilans TK, et al; American Academy of Pediatrics, Black Box Working Group, Section on Cardiology and Cardiac Surgery. Cardiovascular monitoring and stimulant drugs for attention-deficit/hyperactivity disorder. *Pediatrics*. 2008;122(2):451–453
55. McCarthy S, Cranswick N, Potts L, Taylor E, Wong IC. Mortality associated with attention-deficit hyperactivity disorder (ADHD) drug treatment: a retrospective cohort study of children, adolescents and young adults using the general practice research database. *Drug Saf*. 2009;32(11):1089–1110
56. Gould MS, Walsh BT, Munfakh JL, et al. Sudden death and use of stimulant medications in youths. *Am J Psychiatry*. 2009;166(9):992–1001
57. Greenhill L, Kollins S, Abikoff H, McCracken J, Riddle M, Swanson J. Efficacy and safety of immediate-release methylphenidate treatment for preschoolers with ADHD. *J Am Acad Child Adolesc Psychiatry*. 2006;45(11):1284–1293
58. Low K, Gendaszek AE. Illicit use of psychostimulants among college students: a preliminary study. *Psychol Health Med*. 2002;7(3):283–287
59. Cox D, Merkel RL, Moore M, Thorndike F, Muller C, Kovatchev B. Relative benefits of stimulant therapy with OROS methylphenidate versus mixed amphetamine salts extended release in improving the driving performance of adolescent drivers with attention-deficit/hyperactivity disorder. *Pediatrics*. 2006;118(3). Available at: [www.pediatrics.org/cgi/content/full/118/3/e704](http://www.pediatrics.org/cgi/content/full/118/3/e704)
60. Pelham W, Wheeler T, Chronis A. Empirically supported psychological treatments for attention deficit hyperactivity disorder. *J Clin Child Psychol*. 1998;27(2):190–205
61. Sonuga-Barke E, Daley D, Thompson M, Laver-Bradbury C, Weeks A. Parent-based therapies for preschool attention-deficit/hyperactivity disorder: a randomized, controlled trial with a community sample. *J Am Acad Child Adolesc Psychiatry*. 2001;40(4):402–408
62. Pelham W, Fabiano GA. Evidence-based psychosocial treatments for attention-deficit/hyperactivity disorder. *J Clin Child Adolesc Psychol*. 2008;37(1):184–214
63. Van Cleave J, Leslie LK. Approaching ADHD as a chronic condition: implications for long-term adherence. *J Psychosoc Nurs Ment Health Serv*. 2008;46(8):28–36
64. A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. The MTA Cooperative Group. Multimodal Treatment Study of Children With ADHD. *Arch Gen Psychiatry*. 1999;56(12):1073–1086
65. Jensen P, Hinshaw SP, Swanson JM, et al. Findings from the NIMH multimodal treatment study of ADHD (MTA): implications and applications for primary care providers. *J Dev Behav Pediatr*. 2001;22(1):60–73
66. Pelham WE, Gnagy EM. Psychosocial and combined treatments for ADHD. *Ment Retard Dev Disabil Res Rev*. 1999;5(3):225–236
67. Davila RR, Williams ML, MacDonald JT. Memorandum on clarification of policy to address the needs of children with attention deficit disorders within general and/or special education. In: Parker HC *The ADD Hyperactivity Handbook for Schools*. Plantation, FL: Impact Publications Inc; 1991:261–268
68. The College Board. Services for Students With Disabilities (SSD). Available at: [www.collegeboard.com/ssd/student](http://www.collegeboard.com/ssd/student). Accessed July 8, 2011
69. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. *JAMA* 2002;288:1775–1779
70. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: the chronic care model, Part 2. *JAMA* 2002;288:1909–1914