

Assessment and Treatment of Attention-Deficit/Hyperactivity Disorder: Part 1

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Abstract

Attention-deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood. Affecting up to 10% of children in the United States, it is one of the most frequently encountered conditions in primary care. ADHD is a chronic condition, and a significant number of youth continue to show impairment into adulthood. Given the national shortage of specialty mental health providers, primary care providers need to feel comfortable and competent in screening, assessing, and managing ADHD. Successful assessment for this disorder involves regular screening for symptoms of inattention, impulsivity, and hyperactivity during office visits. If ADHD is suspected, a more comprehensive evaluation utilizing standardized rating scales and multiple informants (eg, parents and teachers) is recommended to confirm the diagnosis and guide initial treatment interventions. [*Pediatr Ann.* 2015;44(3):114-120.]



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Attention-deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood and is one of the most frequently encountered conditions in primary care. Although estimates vary, the US Centers for Disease Control¹ and other sources^{2,3} report that approximately 8% to 10% of children in the United States have been diagnosed with ADHD. Although ADHD symptoms often come to clinical attention during

the early school-age years, a substantial number of youth will continue to have at least some level of impairment well into their adult years.⁴ Left untreated, youth (and adults) with ADHD face substantial academic, psychosocial, vocational, and health challenges throughout their development, including elevated risks for substance abuse, vehicular accidents, and legal problems.⁵ Given the national shortage of specialty mental health providers (eg, child and adolescent psy-

chiatrists), it is critical that primary care providers (PCPs) feel comfortable and competent in screening, assessing, and managing ADHD.

There are, however, a number of factors that can interfere with the proper identification of appropriate cases. First, prevalence studies indicate that from the mid-1990s to the mid-2000s there was a 33% increase in prevalence of this disorder.³ This trend, which coincided with increased marketing of ADHD medications, suggests that, at least for certain children, ADHD is overdiagnosed.⁶ Particular care must be given to not mistake developmentally normative challenges with self-regulation as symptoms of ADHD. In a 2012 Canadian study, children who, compared to their same grade peers, were the youngest in their classrooms were 39% more likely to receive an ADHD diagnosis than their oldest classmates.⁷

At the same time, there are several factors that can lead to under-identification and treatment of this condition. First, although boys are 2 to 3 times more likely to have ADHD than girls, they are also more likely to be referred for treatment, as they are (compared to girls) more likely to have trouble controlling their behaviors due to poor control of impulsivity and/or hyperactivity.⁸ By contrast, girls with ADHD are more likely to present as inattentive, versus overtly overactive or impulsive, which can lead to under-recognition of their disorder.⁹

Also, unique sociodemographic, cultural, ethnic, and racial factors may contribute to under-identification of some youth with ADHD.¹⁰ For example, children living in disadvantaged or rural communities may have limited access to care.^{11,12} In other cases, parental or cultural backgrounds may influence parents' willingness to have their child referred for an assessment due to concerns regarding the disorder's validity or stigma associated with being diagnosed.

Furthermore, even for youth who do not meet ADHD diagnostic criteria, high levels of hyperactivity and distractibility are associated with poor academic performance, which suggests that the cut-off for diagnosis may be difficult to define and may vary from setting to setting.^{13,14} Thus, although clinicians must exercise caution in attributing behavior problems or poor school performance to ADHD, they should be mindful that up to two-thirds of youth with ADHD go undiagnosed,¹⁵ and of those that are diagnosed, a majority do not receive adequate treatment.⁶

ETIOLOGY

Genetic vulnerability and environmental interactions that affect neurodevelopment are both thought to play a role in the development of ADHD. Twin studies estimate the heritability of ADHD to be 76%,¹⁶ with multiple genes, each contributing a small effect, implicated.⁶ Examination of these candidate genes provides preliminary evidence of dysregulation of neurotransmitter systems involved in dopamine, norepinephrine, and serotonin pathways,¹⁶ whereas neuroimaging studies indicate that youth with ADHD have delays in cortical maturation.¹⁷

There are also a number of environmental factors that can impact the development of ADHD. Perinatal and early developmental stress caused by exposure to neurotoxins (eg, lead, maternal smoking while pregnant), poor nutrition during pregnancy, perinatal complications (eg, toxemia or fetal traumatic brain injury), and severe early deprivation all have been found to increase the risk of ADHD.² Adverse psychosocial conditions, such as low social economic status and poor access to maternal health care, contribute to the likelihood that young children will be exposed to these deleterious influences.² It is important to note, however, that it is chronic psychosocial deprivation, such as experienced

through chronic maltreatment or institutional rearing, rather than acute exposure to adverse psychosocial circumstances, that increases the risk of ADHD.²

DISEASE COURSE AND PROGNOSIS

ADHD is typically identified in early childhood. Oftentimes, concerns are first raised by teachers or other childcare specialists due to high levels of disruptive behavior, inattention, or academic underachievement in classroom settings. Due to numerous factors that limit parent access to specialty mental health providers, PCPs play the most critical role in the early identification and treatment of ADHD. (It is estimated that youth with ADHD represent 50% of all children in need of psychiatric care, with over 50% of this care being provided by PCPs.)¹⁸ Although typically identified in childhood, ADHD is a chronic disease, with several studies estimating 67% to 90% of affected individuals continuing to have at least some impairment into adulthood.^{19,20} As children grow, their ADHD symptoms and level of functional impairment may change. For example, as children transition into adolescence they may show a decrease in hyperactivity and impulsivity but continue to suffer from inattention, which may hinder their ability to successfully meet new developmental challenges. Moreover, the cumulative effects of poor academic and social functioning can lead in time to the development of problems with low self-esteem, depression, school dropout, substance abuse, and vocational underachievement. There is evidence that early identification and treatment of ADHD can protect against some of these risks. For example, in a 2014 meta-analysis, Schoenfelder et al.²¹ found that consistent treatment with stimulants was associated with lower cigarette smoking rates in youth with ADHD.

Unfortunately, consistent and comprehensive treatment for ADHD is difficult to sustain. The National Institute

of Mental Health Multimodal Treatment Study of Children with Attention-Deficit/Hyperactivity (MTA)²² has been instrumental in both documenting the benefits of intensive treatment and the difficulties in maintaining initial gains. Although the original study results clearly demonstrated that both systematic medication management alone and combined behavioral treatment and medication management were superior to the two comparison groups (usual community care or behavioral management alone) in reduction of impairment, their 8-year follow-up²³ found that the original four groups no longer showed significant differences in outcomes and that all groups were doing more poorly than the normative, non-ADHD comparison group. The follow-up study also found that children of sociodemographic and behavioral disadvantage and those who had the poorest initial response to treatment fared the worst, regardless of initial treatment randomization. Although discouraging, these results highlight the importance that PCPs can play in the ongoing assessment and management of children with ADHD throughout development, including during the adolescent years when many youth may fall out of treatment despite continuing impairment.

COMORBIDITY

It is estimated that two-thirds of youth with ADHD have an additional comorbid disorder, whereas 1 in 5 have three or more comorbid conditions.²⁴ The existence of additional comorbid conditions complicates diagnosis and treatment, predicts poorer functional outcomes, and may necessitate a referral to a specialty provider. Using a standardized broadband screener, such as the Achenbach Child Behavior Checklist, can help clinicians identify possible comorbid conditions, which then can be evaluated further. Common comorbid conditions include oppositional defi-

ant disorder (45%-50%), anxiety disorders (20%-30%), learning disorders (20%-60%), mood disorders, tic disorders, autism, substance abuse problems, and conduct disorder.²⁴ At times, upon further evaluation, a clinician may determine that either ADHD or the comorbid condition is primary. In these cases, care should be exercised to determine whether the secondary condition fully meets criteria to justify an additional diagnosis. For example, if a teenager who previously never struggled with inattention develops significant problems with distractibility and poor academic performance during the course of a depressive episode, then it is likely that the mood disorder is the cause of the distractibility, not ADHD. Similarly, it is fairly common for children with ADHD to develop symptoms of poor self-esteem and periodic negative mood. If there is not clear evidence of pervasive depression, then it is likely that the mood symptoms are a direct result of untreated ADHD, which hopefully will resolve with adequate treatment of ADHD.²

If, however, during the assessment process the clinician finds that the patient meets full *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-5*)²⁵ criteria for ADHD and a second disorder, then it will be necessary to make a second diagnosis and develop an appropriate treatment plan for both disorders. Having a sense for the typical timing of onset of childhood disorders can aid the clinician in determining the likelihood of distinct disorders. For example, both anxiety and ADHD often begin in childhood, whereas in many cases, mood disorders present several years later than symptoms of ADHD.² At times, if it is unclear if the patient meets criteria for a second disorder, it may be appropriate to begin treatment for the known disorder, as efforts continue to further assess for the presence of a second disorder.¹⁰ Special care should be given for assessing

for substance abuse issues in older adolescents presenting with complaints of distractibility and declining school performance. If substance abuse is found, initial efforts should be directed toward treating the substance problem. If, after successful substance abuse treatment the ADHD symptoms remain, then an ADHD medication trial can cautiously be undertaken.²⁶

DIAGNOSTIC CRITERIA

ADHD consists of three primary symptoms: inattention, hyperactivity, and impulsivity. These symptoms can vary in severity from individual to individual, and individually over time, but to meet a diagnostic threshold they must present to a degree that is inconsistent with the youth's developmental level and cause significant impairment. **Table 1** and **Table 2** list current *DSM-5* criteria²⁵ and additional diagnostic features required for a diagnosis of ADHD. Notable differences between the current and previous *DSM* edition²⁷ include (1) the cutoff age for diagnosis being raised from age 7 to 12 years (reflecting the fact that in some children ADHD symptoms only become apparent with increasing academic demands); (2) a co-occurring diagnosis of autism no longer excluding a diagnosis of ADHD; and (3) only five instead of six criteria being required for adolescents and adults older than age 17 years.

To be diagnosed with ADHD, in addition to meeting the requirements outlined in **Table 2**, a child must present as having clinically significant symptoms that meet criteria for one of the five following subtypes. The first subtype—ADHD, predominantly inattentive presentation (ADHD-I)—describes children who display at least 6 of 9 symptoms of inattention. The second subtype—ADHD, predominantly hyperactive/impulsive presentation (ADHD-HI)—describes children who display at least 6 of 9 symptoms of hyperactivity/impulsivity.

TABLE 1.

Diagnostic Criteria for ADHD in *DSM-5*

Symptoms of inattention

- Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities
- Often has difficulty sustaining attention in tasks or play activities
- Often does not seem to listen when spoken to directly
- Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace
- Often has difficulty organizing tasks and activities
- Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort
- Often loses things necessary for tasks or activities
- Is often easily distracted by extraneous stimuli
- Is often forgetful in daily activities

Symptoms of hyperactivity

- Often fidgets with or taps hands or feet or squirms in seat
- Often leaves seat in situations when remaining seated is expected
- Often runs about or climbs in situations where it is inappropriate (in adolescents or adults, may be limited to feeling restless)
- Often unable to play or engage in leisure activities quietly
- Is often "on the go," acting as if "driven by a motor"
- Often talks excessively

Symptoms of impulsivity

- Often blurts out an answer before a question has been completed
- Often has difficulty waiting his or her turn
- Often interrupts or intrudes on others (eg, butts into conversations, games, or activities)

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; *DSM-5*; Diagnostic and Statistical Manual of Mental Disorders, fifth edition.

TABLE 2.

Additional Required Diagnostic Features for ADHD in *DSM-5*

- The symptoms are not solely a manifestation of oppositional behavior, defiance, hostility, or failure to understand tasks or instructions
- Symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic or occupational activities
- Several symptoms were present prior to age 12 years
- Several symptoms are present in two or more settings
- There is clear evidence that the symptoms interfere with, or reduce the quality of, social, academic, or occupational functioning
- The symptoms do not happen only during the course of schizophrenia or another psychotic disorder. The symptoms are not better explained by another mental disorder (eg, mood disorder, anxiety disorder, dissociative disorder, personality disorder, substance intoxication or withdrawal).

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; *DSM-5*; Diagnostic and Statistical Manual of Mental Disorders, fifth edition.

The third subtype—ADHD, combined presentation (ADHD-C)—describes children who display at least six of nine symptoms of both inattention and hyperactivity/impulsivity. The fourth subtype—other specified ADHD—describes children who present with symptoms characteristic of ADHD that cause clinically significant impairment or distress but who do not meet full criteria for one of the above diagnoses. When documenting this diagnosis, the clinician must give the reason why this designation applies (eg, does not meet full criteria for inattention). The final subtype—unspecified ADHD—describes children who present with symptoms characteristic of ADHD that cause clinically significant impairment or distress but who do

not meet full criteria for one of the first four subtypes. Unspecified ADHD is reserved for presentations where the clinician chooses not to specify the reason why full criteria for the disorder are not met and is commonly used in situations, such as in the emergency department, where there is insufficient information to make a more specific diagnosis.

ASSESSMENT

Both the American Academy of Pediatrics²⁶ and the American Academy of Child and Adolescent Psychiatry² have published guidelines to aid clinicians in the assessment and treatment of youth with ADHD. Key features from these guidelines are incorporated in the following recommendations regarding best

practice assessment of ADHD in primary care settings.

PCPs should routinely screen children between the ages of 4 and 18 years for the presence of inattention, hyperactive and impulsive behaviors, and poor home and school functioning during office visits. Additional problems that could also be related to ADHD, such as mood dysregulation, poor self-esteem, aggression, and poor social functioning, if present, should also prompt further investigation for the presence of ADHD. The general necessary components of a comprehensive assessment of ADHD include (1) a complete history and physical examination involving the patient and one or more parents or primary caregivers, (2) contact with teachers or

TABLE 3.

Assessment Challenges and Possible Solutions

Challenges	Possible Solutions
Clinical time constraints and logistical issues (eg, distributing, collecting, and scoring ADHD rating scales)	Consider designating a clinical staff as a “care manager” to distribute, collect, and score rating scales
Parent–teacher discrepancies in symptom reports: Parent symptoms > teacher symptoms	Collect additional collateral information; investigate child–parent relational problems; parent may benefit from BMT
Parent–teacher discrepancies in symptom reports: Teacher symptoms > parent symptoms	Collect additional collateral information; consider family or cultural attitudes regarding “acceptable” child behavior; look for other causes for child’s disruptive behavior in school (eg, anxiety or relational conflict); consider BMT trial alone if diagnosis remains uncertain
Inadequate PCP training in ADHD or diagnostic complexity of presentation, including potential high comorbidity	Consider referral to mental health specialist for diagnosis/treatment of comorbid conditions or utilizing AAP resources, such as “ADHD Toolkit Caring for Children with ADHD: A Resource Toolkit for Clinicians (2nd edition)” ²⁸

Abbreviations: AAP, American Academy of Pediatrics; ADHD, attention-deficit/hyperactivity disorder; BMT, behavioral management training; PCP, primary care physician.

other caregivers familiar with the child’s functioning and behaviors, and (3) a thorough investigation of co-occurring disorders or other conditions that may be the primary cause or are contributing to the patient’s presentation.

Including parent(s) or other caregiver(s) in the interview is essential, as young children will generally not be able to provide valid and reliable information regarding their symptoms and level of impairment, and older children, although better able to describe their symptoms and functioning, may be hesitant to disclose or underestimate their impairment. The PCP should use the *DSM-5* to determine whether or not the patient’s symptoms meet the specific criteria needed to establish a diagnosis of ADHD. The patient (if appropriate) and the parent should be questioned regarding the types of symptoms present; their frequency, intensity, and duration; their first appearance; the settings in which they arise; the functional domains

(eg, social relationships, self-care) affected; and whether there are specific factors that exacerbate or attenuate the level of impairment they cause.

A number of validated and widely used rating scales are available for clinicians to assist in the assessment process.¹⁰ “Narrow band” rating skills, such as the Vanderbilt Assessment Scale, can be used to gather ADHD-specific information regarding typical symptoms. In conjunction with the clinical interview and other collateral information, these scales provide data to confirm or rule out a diagnosis of ADHD. However, ADHD remains a clinical diagnosis, so therefore they should be used along with, and not in lieu of, a complete clinical assessment. Additionally, although they are used to “quantify” symptom severity (both for purposes of assessment and monitoring response to treatment), ADHD rating scales, nevertheless, report “subjective” data provided by parents, teachers, and other caregivers. As

such, their results need to be interpreted in light of the full clinical presentation.

It is also recommended that clinicians utilize “broad band” rating scales during the course of assessment. Although these scales, such as the Achenbach Child Behavior Checklist, do not offer the specificity of ADHD-specific scales, they can be very helpful in identifying other psychiatric concerns that may be present at the time of assessment. Particularly for complex ADHD presentations, early identification of one or more possible comorbid conditions may indicate that the patient would best be served by a referral to a specialty provider, such as a child and adolescent psychiatrist.¹⁰

A final type of rating scale, a functional assessment scale, can also be helpful during the assessment process. These assessment systems (eg, Adaptive Behavior Assessment System, second edition) can provide important data regarding the youth’s current level of day-to-day functioning in a variety of environment situations.⁶ Functional assessment scales (versus strictly symptom scales) allow clinicians to identify specific problem areas in functioning that can be targeted and monitored for response with treatment. One advantage of the Vanderbilt scales is that they gather narrow band, broad band, and functional data all in one form.

Rating scales should be obtained from parents/caregivers, teachers, and other important adults in the youth’s life. Self-report rating scales are also available for adolescents. Although adolescents often under-report their functional impairment, self-reporting allows for disclosure of ADHD symptoms that may not be readily apparent to parents and/or teachers, as many adolescents do not have obvious signs of impulsivity and hyperactivity.²⁶ Rating scale discrepancies among informants do not necessarily rule out ADHD, but should cue the PCP to gather more in-

formation (see **Table 3**) to better understand the clinical presentation.

A critical component in the assessment process is to ascertain if other medical, neurodevelopmental, psychiatric, or psychosocial factors are contributing to, are comorbid with, or can better explain the youth's functional impairments. **Table 4** lists a number of potential conditions that, depending on the clinical presentation, may be of importance. Particular attention should be paid to the possibility that an intellectual deficit, an undiagnosed learning disorder, or a visual/hearing impairment is affecting learning or performance. If any of these concerns are suspected, the PCP can request that the youth undergo specific psychoeducational, speech and language, hearing, or visual testing to explore this possibility.¹⁰ Cognitive testing, in particular, can also be helpful in identifying impairments in working memory or processing speed, which are, in some cases, present in children with ADHD. However, in general, without clear suspicion or clear clinical indication, the routine use of psychoeducational and/or neuropsychological testing (eg, continuous performance testing) is not recommended or considered necessary to diagnose ADHD.² Likewise, if the patient's medical history is unremarkable, it is not necessary to pursue specific laboratory, imaging, or other diagnostic testing. The key point here is to gather a complete psychiatric, medical, developmental, family, and social history and to only pursue specific additional testing or specialty referrals when there is a clear reason to suspect that other biopsychosocial factors may be influencing the clinical presentation and patient and family complaints.

CONCLUSION

ADHD is an impairing childhood neurobehavioral disorder commonly seen in primary care. Due to limited access to specialty care providers, PCPs need to

TABLE 4.	
Differential Diagnoses of ADHD	
General medical conditions	
	Medication effects (eg, bronchodilators, corticosteroids, antiseizure medications)
	Thyroid disorders
	Lead toxicity
	Malnutrition
	Narcolepsy
	Sleep disorders (eg, sleep apnea) and sleep deprivation
	Genetic disorders (eg, fragile X syndrome)
	Metabolic disorders (eg, phenylketonuria)
	Brain injury
	Seizure disorders
Neurologic and developmental issues	
	Static encephalopathy
	Fetal alcohol syndrome
	Intellectual disability
	Sensory impairment (vision, hearing)
	PANDAS (other acute-onset neuropsychiatric disorders)
	Developmental disorders (eg, autism)
	Learning disorders (eg, reading disorder)
	Speech and language disorders (eg, expressive/receptive language disorder)
Psychiatric conditions	
	Disruptive behavior disorders (eg, ODD, CD)
	Anxiety disorders
	Mood disorders (eg, depression, bipolar, disruptive mood dysregulation disorder)
	Obsessive-compulsive disorder
	Posttraumatic stress disorder
	Substance abuse
Environmentally mediated problems	
	Child maltreatment and bullying
	Ineffectual parenting practices
	Socioeconomic disadvantage
	Ineffectual classroom management
	Parental psychopathology, including substance abuse
	Sociocultural factors
Abbreviations: ADHD, attention-deficit/hyperactivity disorder; CD, conduct disorder; ODD, oppositional defiant disorder; PANDAS, pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections.	
Adapted from Smucker and Hedayat. ²⁹	

feel comfortable in screening, assessing, and managing this condition. Typically manifesting in early childhood, ADHD often co-occurs with other psychiatric illnesses, such as oppositional defiant disorder, anxiety, and learning disorders and can cause lifelong impairment if not properly identified and treated. PCPs should routinely screen their patients for

ADHD symptoms during office visits when parents present with concerns regarding their child's behaviors or learning difficulties. If ADHD is suspected, PCPs can follow up with more a more detailed assessment to confirm or rule out the diagnosis. In the most cases, if treatment is indicated and the clinical picture is not overly complex, the PCP

should feel comfortable in initiating treatment and managing the illness. Details regarding the comprehensive treatment of ADHD will be addressed in the forthcoming second part of this article.

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Classified Marketplace

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