

Chapter 13

ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER

Attention deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder defined by symptoms of inattention, hyperactivity, and impulsivity. Clinical guidelines emphasize the use of the *Diagnostic and Statistical Manual of Mental Health Disorders, Fifth Edition*, criteria (available at <http://www.cdc.gov/ncbddd/adhd/diagnosis.html>) to diagnose ADHD. Diagnosis of children up to the age of 16 years requires the presence of at least 6 symptoms of inattention or 6 symptoms of hyperactivity-impulsivity for at least 6 months in two or more environments. Children 17 years of age and older must exhibit at least 5 symptoms of inattention or at least 5 symptoms of hyperactivity-impulsivity. Symptoms of inattention include: failing to pay close attention to details, appearing to not listen when spoken to directly, failing to follow through on instructions or finish assigned work, having difficulty sustaining attention during tasks or play, having difficulty organizing tasks or activities, avoiding or disliking activities that require sustained mental effort (e.g., schoolwork), frequently losing things required for tasks and activities, becoming easily distracted, and experiencing frequent forgetfulness in daily activities. Symptoms of hyperactivity include: being fidgety or restless, leaving a seat when expected to remain seated, running or climbing excessively in inappropriate situations, having difficulty in playing quietly, acting as if “driven by a motor,” and talking excessively. Symptoms of impulsivity include: blurting out answers before a question has been completed, having difficulty awaiting his or her turn, and causing frequent interruptions or intrusions. In addition, several symptoms must have been present prior to 12 years of age; evidence of significant impairment in social, academic, or work settings must occur; and other mental disorders must be excluded.

ETIOLOGY

ADHD is multifactorial in origin, with genetic, neural, and environmental contributions. Twin studies and family studies demonstrate high heritability (0.8) and greater risk of developing ADHD in first-degree relatives. Candidate genes include those involving the dopaminergic and noradrenergic neurotransmitter systems. Neuroimaging studies (functional magnetic resonance imaging and positron emission tomography, commonly recognized as fMRI and PET, respectively) have shown structural and functional differences, particularly of the frontal lobes, inferior parietal cortex, basal ganglia, corpus callosum, and cerebellar vermis. Prenatal exposure to substances (e.g., nicotine, alcohol) and damage to the central nervous system from trauma or infection increase the risk of ADHD.

EPIDEMIOLOGY

U.S. prevalence rates for ADHD vary, depending on criteria used and population studied, with rates typically in the 5% to

10% range. The male to female ratio is 2 to 6:1, with greater male predominance for the hyperactive/impulsive and combined types. Girls often present with inattentive symptoms and are more likely to be underdiagnosed or to receive later diagnoses. Symptoms of ADHD, particularly impulsivity and inattention, persist into adolescence and adulthood in 60% to 80% of patients.

CLINICAL MANIFESTATIONS

ADHD is diagnosed clinically by **history**. Open-ended questions should focus on specific behaviors and their impact on academic performance, family and peer relationships, safety, self-esteem, and daily activities. Information should be gathered from the family and the school via ADHD-specific rating scales such as the Conners' Rating Scales or the Vanderbilt Rating Scales.

A **physical examination** is essential to identify medical (e.g., neurologic, genetic) or developmental problems (e.g., cognitive impairment, language disorder, learning disability, autism spectrum disorder) that may underlie, coexist, or provide an alternative explanation for the child's behaviors. Observation of the child, the parents, and their interactions is part of the evaluation. Keep in mind that children with ADHD can typically focus without hyperactivity in environments with low stimulation and little distraction (e.g., clinician's office).

Laboratory and imaging studies are not routinely recommended but may help exclude other conditions. Consider thyroid function studies, blood lead levels, genetic studies, and brain imaging studies if indicated by medical history, environmental history, or physical examination.

DIFFERENTIAL DIAGNOSIS

The clinician should first consider the child's developmental level to determine whether the behaviors are within the range of normal. Medical conditions, such as sleep-disordered breathing, seizure disorders, substance use, hyperthyroidism, lead intoxication, and sensory deficits, should be considered as possible causes for a child's hyperactivity and distractibility. Inattention and hyperactivity may be present as features of genetic disorders such as fragile X, 22q11.2 deletion syndrome, and neurofibromatosis 1. Chaotic living situations or psychological stress (e.g., bullying, abuse) can also lead to symptoms of hyperactivity, impulsivity, and inattention. Children who have symptoms of ADHD in only one setting may be having problems due to cognitive level, level of emotional maturity, or feelings of well-being in that setting.

More important, coexisting conditions are present in up to 60% of children with ADHD. These include psychiatric conditions, particularly oppositional defiant disorder, conduct disorder, anxiety disorder, and depression; learning disabilities; language disorders; and tic disorders. These conditions are also part of the differential diagnosis of ADHD.

TREATMENT

Management begins with recognizing ADHD as a chronic condition and educating affected children and their parents about the diagnosis, treatment options, and prognosis.