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STATEMENT OF EDITORIAL PURPOSE

The *Hospital Physician Psychiatry Board Review Manual* is a study guide for residents and practicing physicians preparing for board examinations in psychiatry. Each quarterly manual reviews a topic essential to the current practice of psychiatry.

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Attention-Deficit/ Hyperactivity Disorder in Adults

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INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is a heterogeneous disorder that impairs academic, social, and occupational functioning. This disorder historically was considered by clinicians to be limited to childhood, affecting 4% to 12% of school-age children,[1,2] with a male to female ratio of about 3:1. However, follow-up studies suggest it persists into adulthood in 10% to 60% of childhood-onset cases and as a diagnosis is present in approximately 4.5% of adults, with a male to female ratio of about 1:1.[3,4] Some symptoms also may persist in many adults who would not meet full diagnostic criteria. ADHD is associated (comorbid) in a significant number of patients with a history of oppositional defiant disorder, conduct disorder, mood and anxiety disorder, and substance abuse and cigarette smoking.

Signs and symptoms of ADHD include inattention, hyperactivity, and impulsiveness, and onset is by age 7 after a duration of 6 months or more. Impairment is in at least 2 settings. In adulthood, symptoms include difficulty getting started on tasks, variable attention to details, difficulties with self-organization and prioritization, and poor persistence in tasks that require sustained mental effort.[5–8] Impulsivity and low frustration tolerance may be present to varying degrees, while hyperactivity tends to be a less salient symptom in adults as compared with childhood presentations of ADHD.[3] Patients who present in primary care settings often have chaotic lifestyles because of difficulty sustaining attention, having forgetfulness and distractibility, and problems with reading comprehension. They often have associated psychiatric comorbidities. They appear to be disorganized and may rely on substances such as drugs and alcohol to "get by." They may appear impulsive, having difficulty waiting for things and tending to interrupt others. Adults often do not appear overtly "hyperactive" but describe a sense of inner restlessness. They are more likely to have motor vehicle accidents and receive citations for speeding. They often have a family member with ADHD. Higher separation and divorce rates and more frequent job changes are associated with ADHD,[3,8] and persons with ADHD have 4 times the prevalence of sexually transmitted diseases as the general population and more teenage pregnancies.

Many adults with ADHD have severe difficulties with "executive functions." Executive functions include time management, organization, and sequential and hierarchical thinking. Executive functions are essential for goal-orientation and self-regulation. Executive functions likely involve working memory, where the individual maintains an internal representation of a future goal in order to guide actions in the direction of achieving that goal. People who have intact executive functions are able to inhibit or defer responses that are inappropriate to achieving a goal. Adults with ADHD have difficulty completing a task or getting organized.

ADHD is thought to be caused by a complex combination of environmental, genetic, and biologic factors, and the precise etiology in a given patient may be unknown and may differ among individuals. However, there likely is a strong genetic component in most people that is expressed in changes in brain biologic functioning involving both the noradrenergic and dopaminergic systems.[9] There are well-defined prenatal and perinatal risk factors for ADHD, which include exposure to cigarettes and alcohol in utero, low birth weight, and brain injuries occurring in utero.[10] Family, twin, adoption, and gene segregation analysis studies suggest that genetics plays a major role in ADHD. The influence of genetics in the development of ADHD varies from 0.6 to 0.8, where "1" equals "totally genetic."[11–15] Approximately half of parents who have been diagnosed with ADHD will have a child with the disorder.

A possible association between ADHD and several genes, including those regulating dopamine, norepinephrine, serotonin, gamma-aminobutyric acid, and androgens, has been investigated.[16] The most widely accepted gene association is with the D4 dopamine receptor gene.[17] Norepinephrine and epinephrine also influence the amount of available dopamine at this receptor site, and this is purportedly why medications affecting norepinephrine or epinephrine also can influence the