The recommendations on the evaluation and management of attention deficit/hyperactivity disorder (ADHD) in children were developed by summarizing the guidelines and recommendations of review articles (Pliszka, 1991; Voeller, 1991; Kelly and Aylward, 1992; Reiff et al., 1993; Culbert et al., 1994; Vinson, 1994; Searight et al., 1995) and a textbook (Mercugliano, in Schwartz, 1990). The review articles were selected from a MEDLINE literature search on the key phrase “attention deficit disorder,” looking for articles in the English language published between the years 1985 and 1995. Focused assessment of the literature with respect to specific areas of importance or disagreement among the reviews were then conducted to further clarify those issues.

**IMPORTANCE**

Attention deficit/hyperactivity disorder (ADHD) or attention deficit disorder or attentional disorder is a common and important problem among children. About 3 to 5 percent of school-age children have characteristics consistent with the clinical presentation of ADHD (Kelly and Aylward, 1992; Reiff et al., 1993). ADHD occurs about six times more frequently among boys than girls in clinical studies (Reiff et al., 1993) and three times more frequently in population-based studies (Searight et al., 1995). These disorders have serious effects on a child's functioning in our society.

Though not explicitly documented in any of the reviews, it is evident that the core symptoms of ADHD, inattention and impulsivity/hyperactivity, may lead to secondary morbidity for the child, the child's family, and society. The child may suffer from insult to the affect such as poor self-esteem as well as more tangible negative outcomes such as greater risk of accidents, cigarette or alcohol use, drug abuse, criminal activity, and poor school performance and subsequent failure in the adult work force (Searight et al., 1995).
The child's family may suffer dysfunction in trying to deal with a child with an attentional disorder. Society suffers the disruption of classrooms by children with ADHD in addition to the costs associated with the specific effects on the child and family and the costs to society of an unemployed adult.

ADHD is one of the most common chronic neurobehavioral problems of childhood. As noted below present studies indicate that the appropriate diagnosis and treatment of these disorders may lead to short-term and perhaps long-term benefits to the child, the child's family, and society. Inappropriate diagnosis and treatment will lead to unwarranted or inappropriate use of scarce mental health resources and possible adverse side effects from pharmacologic interventions.

Efficacy and/or Effectiveness of Interventions

Screening and Prevention

Though health care providers do not specifically screen for the presence of ADHD among children, they should in the course of routine health supervision inquire and provide guidance with regard to the child's temperament and behavior and in the areas of parenting and discipline (American Academy of Pediatrics Committee on Psychosocial Aspects of Child and Family Health, 1988). By identifying earlier the child with the potential for ADHD, the health care provider might expect to circumvent secondary morbidity to the child and the family, such as low self esteem and family dysfunction, though not the attention deficit itself.

Diagnosis

ADHD comprises a constellation of clinical symptoms. It has been defined as a disorder where "Children ... exhibit core symptoms of inattention, impulsivity and overactivity that are inappropriate for their developmental level and interfere with their optimal functioning (Reiff et al., 1993).

The symptoms characterizing the syndrome of ADHD have been formalized into diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) (American Psychiatric Association
[APA], 1994). All 5 criteria must be met for diagnosis. In this classification, ADHD is divided into three subtypes (see Table 5.1).

Table 5.1

Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder
A. Six or more of the following symptoms of inattention and six or more of the following symptoms of hyperactivity/impulsivity have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level in either of the following categories:

1. **Inattention**
   - often fails to give close attention to details or makes careless mistakes in schoolwork, work, or 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 (such as schoolwork or homework)
   - often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books or tools)
   - is often easily distracted by extraneous stimuli
   - is often forgetful in daily activities

2. **Hyperactivity-impulsivity**
   - Hyperactivity
     - often fidgets with hands or feet or squirms in seat
     - often leaves seat in classroom or in other situations in which remaining seated is expected
     - often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
     - often has difficulty playing or engaging in leisure activities quietly
     - is often "on the go" or often acts as if "driven by a motor"
     - often talks excessively
   - Impulsivity
     - often blurts out answers before questions have been completed
     - often has difficulty waiting turn
     - often interrupts or intrudes on others (e.g., butts into conversations or games)

B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years

C. Some impairment from the symptoms is present in two or more settings (e.g., at school/work and at home).

D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder.

Types

- ADHD, Combined Type: if criteria 1 and 2 are met
- ADHD, Predominantly Inattentive Type: if criteria 1 only is met
- ADHD, Predominantly Hyperactive-Impulsive Type: if criteria 2 only is met
- ADHD, Not Otherwise Specified: if prominent symptoms of inattention or hyperactivity-impulsivity are present but do not meet criteria for ADHD.

Source: Diagnostic and Statistical Manual of Mental Disorders IV, 1994.

The distinguishing feature of these subtypes is degree of hyperactivity-impulsivity. In ADHD predominantly hyperactive-impulsive type, the children are more disruptive, irresponsible, messy and immature. They usually have more problems with peer relationships than their ADHD primarily inattentive type counterparts. In addition, family members of this former group of children have been found to be more aggressive, with greater tendency towards substance abuse and lower incidence of Learning Disability and anxiety than the group with ADHD-inattentive type (APA, 1994).

In contrast, the group of children with ADHD predominantly inattentive type tend to function with a slower cognitive speed and appear more confused and apathetic. Forty percent of girls who present with ADHD are found to have the ADHD-inattentive type. This subgroup of children tend to be diagnosed at a later age when academic difficulties escalate (Reiff et al., 1993).

Children may also have ADHD-combined type, fulfilling the criteria for both inattention and hyperactivity-impulsivity. The last category is ADHD-Not Otherwise Specified, in which the diagnostic criteria are not fully met. The importance of differentiating clinical subtypes has implications for treatment strategies.

Prior to the formulation of DSM-IV, the diagnosis of ADHD by DSM-III-R was based on a 14-item list of symptoms of inattention, impulsivity and hyperactivity. The presence of 8 or more of the listed
symptoms would be consistent with a diagnosis of ADHD. There was no diagnostic distinction between the clinical subtypes.

Both DSM-III and DSM-IV stipulate that onset of symptoms must occur before 7 years of age, that symptoms be present for greater than 6 months and are not accounted for by other mental disorders.

The developmental level of each child must be considered when presented with parental concerns of hyperactivity and inattention. Preschool children may exhibit these symptoms, but the level of activity and attention may be appropriate for their age and developmental level. Many will not go on to be diagnosed with ADHD (APA, 1994). In fact, some authors have proposed changing the criteria for preschool children by extending the duration of symptoms to 12 months and increasing the number of criteria behaviors to 10 of the 14 listed in DSM-III-R (Reiff et al., 1993). One may also consider the degree of dysfunction caused by the symptoms in a preschool setting as a criterion for diagnosis (Reiff et al., 1993).

The symptoms of inattention and hyperactivity are nonspecific and may be a manifestation of many medical, neurological, or psychiatric disorders. The challenge of making an accurate diagnosis of ADHD is compounded by the fact that many of the entities in the list of differential diagnosis may co-exist with ADHD. In one report, Learning Disability and Language Disorder may occur in 30-60 percent of children with ADHD. Anxiety Disorder occurs in 25 percent and other mood disorders may be present in 30 percent of the ADHD children. Oppositional Defiant Disorder may occur as often as 40-65 percent while Conduct Disorder may occur in 21-50 percent in children with ADHD (Reiff et al., 1993). In another series of consecutive referrals to a tertiary university based behavioral neurology clinic, only 4 out of 63 children with ADHD had the single diagnosis. Eighty-three percent of the children also had Learning Disability and 73 percent fulfilled the criteria for depression (Weinberg and Emslie, 1991). Making the correct diagnosis and identifying the comorbid disorders are important in determining the appropriate treatment.

Specific diagnoses to be considered as differential diagnoses and comorbid conditions are (Weinberg and Emslie, 1991; Reiff et al., 1993):
1. Affective Disorders: Depression, Anxiety, Mania
2. Learning Disorders: Mental Retardation, Specific Learning Disabilities
3. Language Disorders
4. Disorders of Disruptive Behaviors: Oppositional Defiant Disorder, Conduct Disorder
5. Thought Disorder
6. Sleep Disorders: Narcolepsy, Obstructive Sleep Apnea
7. Poor environmental fit
8. Underlying medical or neurological problem: Hyperthyroidism, Seizures, Tourette's Syndrome, Sensory Impairments

Because ADHD represents a clinical syndrome with multiple etiologies and comorbidities, the evaluation should involve investigation into all aspects of the child's life including developmental, psychological, psychosocial and psychoeducational components (Reiff et al., 1993). Ideally, such a broad scope of evaluation necessitates a multidisciplinary team approach to diagnosis and treatment. The practitioner has two options when a child presents with attentional problems: 1) refer the child to a multidisciplinary clinic specializing in developmental/behavioral problems, or 2) serve as a central coordinator who obtains information from various sources and consultants and synthesizes the information to reach a diagnosis and treatment plan.

In either case, a comprehensive evaluation of the child with attentional problems as conceptualized by Reiff et al. (1993) includes four components:
1. Medical
2. Psychological
3. Psychosocial
4. Psychoeducational

This component of the evaluation may be considered the initial work-up to establish working diagnoses. The objective is to
differentiate symptoms through the interview, examination and screening
tests.

A careful history obtained from the caretaker should be the first
step. A description of the symptoms and behaviors of concern, the time
of onset, preceding events and duration are essential. Questions should
focus on the ruling in or out differential diagnoses. While not clearly
stated in the DSM-IV (APA, 1994), the diagnosis of ADHD can be made
based solely on the history obtained from the caretakers (Shaywitz,
1991). The DSM-IV does stipulate that the symptoms of inattention and
impulsivity/hyperactivity be present in more than two settings (APA,
1994). It also suggests that the practitioner obtain information on the
child's behavior in a variety of settings. Other authors recommend
obtaining input specifically from the child's caretaker and teacher(s)
as well as the child (Weinberg and Emslie, 1991; Kelly and Aylward,
1992; Reiff et al., 1993).

The child's developmental history is important to support the
finding of subaverage intellectual functioning (Kelly and Aylward,
1992). A review of the current medications may reveal some that affect
Documenting the past medical history, including the birth history may
suggest an underlying medical problem. Family history of ADHD, Learning
Disorder, mental retardation, neurologic and psychiatric illnesses
should be elicited.

The physical examination should include identifying dysmorphic
features which may indicate a further work-up and the presence of
physical findings suggesting an underlying medical condition. Hearing
and vision should be a routine part of the evaluation to rule out
sensory impairment as a contributing cause of decreased attention (Kelly
and Aylward, 1992; Reiff et al., 1993). A thorough neurological
examination is necessary to rule out static or progressive neurological
deficits. This includes a mental status examination, assessment of
cranial nerves, motor, sensory and cerebellar functions. Soft
neurological signs such as dysdiadokinesis, dysegraphesthesia and motor
incoordination may be present, but are not diagnostic of ADHD (Kelly and
Further information may be obtained through screening tests in the practitioner's office, behavior rating scales, or through consultants and schools (see below). The practitioner should obtain the following information regarding the child:

1. Level of cognition
2. Behavior and performance at school
3. Behavior and function at home
4. Social environment
5. Affective state

After reviewing all the information, the practitioner can formulate the diagnosis and treatment plan.

The practitioner may use different methods to assess a child's affective and behavioral state. The assessment should include both the child's and adults' perspectives.

Behavioral rating scales have been widely used. They are an efficient means of obtaining input from various sources regarding a child's behaviors (Mercugliano, in Schwartz, 1990; Reiff et al., 1993). Rating scales are available for teachers and parents. Some assess single specific behaviors (unidimensional) and others a series of behaviors (multidimensional). The most widely used are the Conners Scales for parents and teachers. These are standardized for children from age 3 to 17 years old and contains scales for conduct problem, learning problem, psychosomatic symptoms, impulsivity-hyperactivity, and anxiety (Kelly and Aylward, 1992). A shorter index assessing just the impulsivity-hyperactivity symptoms has been used to assess medication efficacy (Kelly and Aylward, 1992). Other commonly used scales that can be used to evaluate a range of behaviors include the Child Behavior Checklist and the Yale Children's Inventory, Aggregate Neurobehavioral Student Health and Education Review (ANSER), and Attention Deficit Disorder with Hyperactivity Comprehensive Teacher Rating Scale (AcTERS); each evaluates a specific complex of behaviors and the child's current functioning (Reiff et al., 1993). Other scales are used to assess for affective symptomatology such as the Children's Depression
Inventory and the Revised Children's Manifest Anxiety Scale (Reiff et al., 1993), both of which are completed by the child.

The pitfall of rating scales is that they are nonspecific and are subject to the "halo-effect" where the child's behavior is either rated as all good or all bad (Searight et al., 1995). Often there is a discrepancy between a teacher's and parent's perception of the child's behavior. Evidence tends to support giving greater weight to the teacher's evaluation of the child's behavior because the teacher is observing the child's behavior in a structured and task-oriented setting which tends to accentuate the attentional and behavioral problems (Pliszka, 1991).

The child's perspective on his difficulties can be obtained through an interview with the child. This interaction also allows the practitioner to observe the child's behavior and affect, assess language skills and cooperation. The interview itself may disclose the child's perception of the problems, himself and his environment, the presence of a thought disorder, and indications of affective disorders. Other methods that can be used to elicit information from the child are drawings, sentence completion, and rating scales for symptoms such as anxiety and depression. Referral to a psychiatrist is indicated if any psychopathology is suspected.

Only 20 percent of children with ADHD will exhibit behaviors of inattention, hyperactivity, and impulsivity while at a doctor's office. The lack of observed behavior in a clinical setting does not rule out ADHD (Pliszka, 1991).

Objective measures of attention may assist in the diagnosis of attentional disorders but should not be used in isolation. One widely used test is the Continuous Performance Task. However, this test is affected by age and intelligence and has a variable but high false negative rate of 15-35 percent (Kelly and Aylward, 1992). This test also can be used to monitor medication response. Other specific tests for inattention have yet to be proven in validity (Kelly and Aylward, 1992).

The practitioner should obtain information about the child's environment including home, school, and daycare center (Kelly and
Aylward, 1992). Delineation of the family constellation is important to assess the level of stability and support that is available. The functional status of the family should also be assessed in terms of conflict resolution, coping strategies and degree of stressors (Reiff et al., 1993). Parental expectations for the child should be explored to evaluate the appropriateness for that particular child (Voeller, 1991; Reiff et al., 1993).

Psychoeducational testing involves establishing the child's cognitive function and academic achievements. Psychoeducational testing may also provide supporting evidence of attentional difficulties and identify the presence of a learning disability (Kelly and Aylward, 1992). The testing situation allows the clinician to observe the child's behaviors and can be a valuable source of information in making the diagnosis (Kelly and Aylward, 1992; Reiff et al., 1993).

An assessment of the child's cognitive functioning is needed to rule out mental retardation. For screening purposes, neurodevelopmental assessment using standardized tests such as the Pediatric Examination of Educational Readiness (PEER), the Pediatric Early Elemental Examination (PEEX), and the Pediatric Examination of Educational Readiness at Middle Childhood (PEERAMID) may be used to look for deficits in language, cognition, and visual-motor functioning (Kelly and Aylward, 1992; Reiff et al., 1993). One author has formulated a Mental Status Exam for the same purpose (Searight et al., 1995).

A full evaluation of a child's cognitive functioning can be obtained using the Weschlers Scales of Intelligence, the Stanford-Binet, and the Kaufman Assessment Battery for Children. Subtests in the Weschler Intelligence Scales may provide supporting evidence for attention deficits (Kelly and Aylward, 1992). The Kaufman ABC likewise yields simultaneous processing and sequential scores which are sensitive to attention deficits (Kelly and Aylward, 1992). Other tests are available to distinguish ADHD from other learning disorders and processing problems (Kelly and Aylward, 1992).

The Woodcock-Johnson Psychoeducational Battery Tests of Achievement is widely used to assess the child's academic level in subjects such as math, reading, written language, knowledge and skills clustering (Reiff
et al., 1993). Kelly and Aylward (1992) suggest that tests of academic achievement should be routinely incorporated into the evaluation of ADHD.

The full psychoeducational assessment battery may be obtained through the school as an evaluation for an Individualized Education Plan, or through a consulting psychologist. Voeller (1991) suggests that psychoeducational testing be done prior to the recommendation of starting medication. Searight et al. (1995) suggest that formal psychoeducational testing be done in cases where clinical evidence for diagnosis of ADHD is equivocal, where comorbid conditions are suspected and where medical treatment meets with poor response.

Speech and language evaluation by a speech pathologist is indicated if screening reveals deficits in this area. Neuropsychological assessment is another option if screening reveals specific neurological defects (Mercugliano, in Schwartz, 1990; Reiff et al., 1993).

In summary, ADHD is a clinical diagnosis based on fulfilling the DSM-IV criteria. The evaluation involves obtaining a detailed history, physical and neurologic examination, neurodevelopmental assessment, vision/hearing screen, assessment of social/emotional status as well as environmental factors in both school and home (Kelly and Aylward, 1992; Reiff et al., 1993). In addition, specific evaluation of attention, behavior and cognitive functioning is necessary (Kelly and Aylward, 1992). Using a unidimensional scale with environmental descriptors is the minimum assessment recommended for diagnosis (Kelly and Aylward, 1992). In addition, Reiff et al. (1993) stress that interviews with teachers, parents and child are essential to the evaluation. Additional evaluations may be indicated if during the initial work-up, the possibility of comorbid disorders arise.

**Treatment**

Though the evidence is not overwhelming, most agree that the treatment of ADHD should be multidisciplinary and is dependent, to some extent, on comorbid conditions (Voeller, 1991; Kelly and Aylward, 1992; Culbert et al., 1994). Though studied inadequately, the few treatment plans for ADHD that have shown any long-term benefit have involved the
use of multiple modalities incorporating medical, psychological, psychosocial, and educational interventions (Culbert et al., 1994). Vinson (1994) notes that long-term outcome cannot be predicted (Klein and Mannuzza, 1991). Some suggest that, in a subset of children with minimal ADHD, that psychological and behavioral therapies alone may be sufficient and medical therapy may not be needed (Voeller, 1991). The goals of treatment are normal development and reduction of problem behaviors such as poor self-esteem and dysfunctional parent-child and peer-child relationships (Culbert et al., 1994).

Following the diagnosis of ADHD, the first responsibility of the health care provider is to educate the family and child about the disorder (Kelly and Aylward, 1992; Culbert et al., 1994). Parents should be assured that they are not to blame for the presence of the attention deficit in their child. Another function of education is for the health care provider to point out the child's personal strengths (Kelly and Aylward, 1992; Culbert et al., 1994).

Psychological and behavioral therapies combined to meet the characteristics of the child, family, and school are thought by some to be essential to appropriate management of children with ADHD (Culbert et al., 1994). In addition, behavioral intervention may enhance stimulant therapy (Pelham and Murphy, in Hersen, 1986), though Culbert et al. (1994) state that such evidence is difficult to document (despite the fact that they recommend multimodal therapy as the standard of care). On the other hand, Pliszka (1991), a psychiatrist, states quite strongly that behavioral or psychologic or psychiatric therapy is not a substitute for stimulant pharmacotherapy but may be helpful if the child does not respond to stimulant therapy, if a disciplinary issue arises, such as aggression or stealing, or in the presence of an oppositional or antisocial behavior.

The goals of psychological and behavioral therapies are to target cognitive problems and behavioral deficits, treat comorbid problems such as oppositional defiant behavior and conduct disorders, enhance competencies, and increase family and school involvement in the child's treatment (Culbert et al., 1994). Psychological and behavioral therapies include (Culbert et al., 1994):
1. behavioral parent training
2. behavioral family therapy
3. classroom contingency management procedures
4. self-instructional problem-solving training
5. anger management training
6. group social skills training

Such therapies are provided by developmental/behaviorists, psychologists, and/or psychiatrists.

Kelly and Aylward (1992) divide behavior therapies into home interventions and classroom interventions involving environmental modifications in those respective milieus. Providing parents written information about behavioral techniques is minimally effective (Vinson, 1994; Long et al., 1993). Family therapy may decrease parent-child conflict (Vinson 1994; Barkley et al., 1992) and reduce delinquency in children when applied in conjunction with stimulant therapy (Satterfield et al., 1987). Behavior modification in the classroom setting may aid the child's behavior when coupled with low-dose methylphenidate, but not to a greater degree than with a higher dose of methylphenidate alone (Vinson 1994; Carlson et al., 1992; Pelham et al., 1993). Self-control techniques based on social learning theory may add little benefit to methylphenidate therapy (Vinson 1994; Horn et al., 1991; Ialongo et al., 1993).

Despite the general recommendation to provide psychological and behavioral therapy to children with ADHD, there are few studies that support their use (Gittleman and Abikoff, 1989), though these few are described as promising by Culbert et al. (1994). Vinson (1994) indicates that psychological and social therapies are at best modest in their effects and are extremely labor intensive. Any positive effects are not curative, but rather help the child, family, and the teacher cope with the difficulties of the attentional disorder, utilizing the strengths of all involved (Culbert et al., 1994). Psychotherapy may be helpful in individual cases; there is little evidence that cognitive therapy is useful (Kelly and Aylward, 1992; Abikoff, 1991).
Psychoeducational intervention is also required (Culbert et al., 1994). Each school-age child with ADHD should have an Individual Education Plan (IEP) formulated by the school system that takes into account the child's information processing and production capabilities (Culbert et al., 1994). The IEP may be requested by the parent, teacher, or health care provider. The IEP and its implementation are mandated by federal Public Law 94-142 when learning disabilities or emotional disturbances, as well as other medical conditions, are impeding the education of a child (American Academy of Pediatrics Committee on Children with Disabilities, 1992). Speech or language disorders are among the many psychoeducational issues that must be addressed (Culbert et al., 1994).

Pharmacologic treatment may lead to improved short-term abatement of the core symptom complex of inattention, impulsivity, and overactivity compared to nonpharmacologic or no treatment (Kavale, 1982; Culbert et al., 1994; Vinson, 1994; Pelham et al., 1990). By increasing attention and decreasing impulsivity, the child may have fewer disruptive behaviors (Pelham et al., 1990) and show additional effects such as an improvement in handwriting (Culbert et al., 1994) and enhanced academic performance (Kavale, 1982; Kelly and Aylward, 1992; Pelham et al., 1990). Medication has not been shown to lead to long-term removal of these symptoms (Fox and Rieder, 1993; Culbert et al., 1994; Barkley et al., 1990; Horn et al., 1991; Ialongo et al., 1993; Brown et al., 1986a; Brown et al., 1986b). Long-term benefits occur only while medication is still being administered; this also appears to be the case for behavioral therapy (Vinson, 1994; Firestone et al., 1986). As mentioned above, a favorable response to pharmacologic intervention should not be used as confirmation of the diagnosis of ADHD since many children without ADHD show a positive response to medication as well (Voeller, 1991; Culbert et al., 1994; Rapoport et al., 1980; Ullman and Sleator, 1986). The health care provider must educate the child, the family, and the teacher about the risks and benefits of pharmacologic treatment, including side effects.

Unlike the narrative reviews of other authors, a rigorous meta-analytic review of 135 studies by Kavale (1982) showed quite
convincingly that stimulant therapy is efficacious for the treatment of short-term outcomes in ADHD. Studies with findings amenable to meta-analysis that looked at hyperactivity as a primary symptom and that had a comparison group were included. Outcomes were then partitioned into behavior, cognitive, and physiologic groups. He found that stimulant therapy had positive effects on behavioral and cognitive outcomes and some negative effects on physiologic outcomes. The average child with hyperactivity treated with stimulant therapy had better behavioral outcomes than 72 percent of control subjects in the areas of general ratings, activity level, attention and concentration, and behavior characteristics, though not for anxiety. Although the effects were not as large, the average hyperactive child treated with stimulants scored higher than 69 percent of control subjects on measures of intelligence, achievement, perception, motor skills, and memory. Most psychophysiological outcomes revealed a negative effect of stimulant therapy such as effects on the cardiorespiratory system and on weight and height; positive effects were found on galvanic skin response, average evoked potential, electroencephalogram, and sleep variables. He also found that methyphenidate, dextroamphetamine, pemoline, levoamphetamine, and benzedrine were all effective while caffeine was not. In addition, he tempered his analysis by analyzing issues of study variables, subject variables, and design variables, but still came to the conclusion that stimulant pharmacotherapy was efficacious in the treatment of ADHD. Kavale (1982) then closed his meta-analytic review with a call to “debate the ethical questions concerning the use of stimulant drugs with hyperactive children.”

The most commonly used medications for the treatment of ADHD are the stimulants methylphenidate (Ritalin), dextroamphetamine (Dexedrine), and pemoline (Cylert) (Voeller, 1991; Kelly and Aylward, 1992; Fox and Rieder, 1993; Culbert et al., 1994; Searight et al., 1995). Pliszka (1991) reports that the stimulants have a rapid onset of action (i.e., within a few days to two weeks). The stimulants lead to an improvement in at least 75 percent of children with attention deficit disorders and appear to be efficacious from childhood through adulthood (Culbert et al., 1994). Stimulant therapy is not recommended for children less than
three years of age (Barkley, 1989). Improved outcomes include measures of: attention and vigilance, short-term memory, fine motor output in the laboratory, behavior in the classroom, interpersonal interactions, teacher and peer perceptions of the child, and academic achievement (Culbert et al., 1994; Tannock et al., 1989; Vyse and Rapport, 1989; DuPaul and Rapport, 1993; Evans and Pelham, 1991; Dalby et al., 1989; Klorman et al., 1988; Barkley et al., 1989; Klorman et al., 1990; Kaplan et al., 1990). The stimulants are safe and of low cost (Culbert et al., 1994). Searight (1995) states an unreferenced opinion that stimulants appear in general to be more effective in treating ADHD compared to other medications.

Methylphenidate is the most commonly prescribed stimulant for treatment of ADHD. Culbert et al. (1994) recommend that the use of methylphenidate in a child begin with a double-blind placebo-controlled trial in which 0.3 and 0.5 milligram per kilogram doses and placebo are tested over a three-week period using teacher, parent, and child ratings to assess response on a weekly basis. Voeller (1991), Kelly and Aylward (1992), Vinson (1994) and Searight et al. (1995) make similar recommendations for a double-blind placebo trial (McBride, 1988; Porrino et al., 1983; Fine and Jewesson, 1989; DiTraglia, 1991; Ullmann et al., 1986; Barkley et al., 1988). Standard dosing of methylphenidate is 0.3 to 0.5 milligram per kilogram per dose at four-hour intervals, two to three times per day (Culbert et al., 1994). Voeller (1991) states that doses as high as 1.0 milligram per kilogram per dose may be permissible in certain children. Symptoms of inattention and impulsivity respond to lower doses whereas symptoms of overactivity respond to higher doses but decrease cognitive performance (Voeller, 1991; Kelly and Aylward, 1992; Culbert et al., 1994; Tannock et al. 1989; Barkley et al., 1991; Sprague and Sleator, 1977; Rapport et al., 1988; Swanson and Kinsbourne, 1988). Methylphenidate efficacy is usually evident within one to two weeks (Searight et al., 1995). The sustained release form of methylphenidate does not seem to be as effective as the standard form (Voeller, 1991; Kelly and Aylward, 1992; Searight et al., 1995; Fitzpatrick et al., 1992; Pelham et al., 1987; Pelham et al., 1990).
Dextroamphetamine may be used in children who do not respond to methylphenidate (Culbert et al., 1994). The dose for dextroamphetamine is half that for methylphenidate (Culbert et al., 1994). Kelly and Aylward (1992) raise concerns of abuse potential and side effects with dextroamphetamine but also acknowledge that at the time of their publication it was the only stimulant approved for use among children less than six years of age. It is evident from the literature, however, that dextroamphetamine is not the only stimulant used in that age group.

Pemoline is another stimulant alternative. Pemoline may be given once per day (Searight et al., 1995). Searight et al. (1995) recommend an initial dose of 37.5 milligrams increased by 18.75 milligrams every three to five days until a change in behavior is noted. A positive response with pemoline may not be apparent for several weeks (Fox and Rieder, 1993). Children on pemoline must be monitored for possible liver toxicity (Pratt and Dubois, 1990; Nehra et al., 1990) and should have baseline liver function tests performed (Kelly and Aylward, 1992; Searight et al., 1995). Dextroamphetamine and pemoline are equal in effectiveness to methylphenidate (Kavale, 1982; Vinson 1994; Pelham et al., 1990).

The use of stimulant therapy should be preceded by collection and evaluation of the following data (Culbert et al., 1994):

1. blood pressure
2. weight and height

The presence of tics or Tourette disorder is a relative contraindication to the use of stimulant therapy (Voeller, 1991; Culbert et al., 1994). Kelly and Aylward (1992) feel that stimulants may be used in children with Tourette disorder if the morbidity due to the ADHD outweighs that due to Tourette disorder. Seizure disorder is no longer thought to be a contraindication to stimulant therapy (Culbert et al., 1994) particularly with regard to methylphenidate (Voeller, 1991; Kelly and Aylward, 1992).

Culbert et al. (1994) suggest that the following side effects be monitored:

1. tics
2. decreased appetite
3. insomnia
4. headaches
5. stomach aches
6. irritability
7. anxiety
8. excessive sadness or weepiness
9. social withdrawal
10. euphoria
11. dizziness
12. mildly elevated heart rate
13. minor increases in blood pressure

Fox and Rieder (1993) also mention transient psychosis, rash, and eosinophilia as possible side effects of stimulant therapy. Growth delay may occur in children on stimulant therapy; however, catch-up growth may occur once off the medication (Voeller, 1991; Kelly and Aylward, 1992; Vinson, 1994). Barkley et al. (1990) have suggested that side effects should be monitored before and after start of medication therapy.

Tricyclic antidepressants, including imipramine and desipramine, are second-line choices for pharmacologic treatment of children with ADHD (Kelly and Aylward, 1992; Fox and Rieder, 1993; Culbert et al., 1994; Garfinkel et al., 1983; Gualtieri et al., 1991). Double-blind placebo-controlled trials have shown a 60 to 70 percent efficacy rate. The positive effects of the tricyclic antidepressants have been mostly on inattention, impulsivity, and overactivity; cognitive effects are equivocal (Culbert et al., 1994; Vinson, 1994; Searight et al., 1995; Pliszka, 1987; Biederman et al., 1989a; Biederman et al., 1989b; Biederman et al., 1993). Some studies indicate long-term memory may also be improved (Culbert et al., 1994). The initial dose for imipramine and desipramine is 0.3 milligram per kilogram per day and it is increased every 3 to 4 days to a maximum of 2 to 3 milligrams per kilogram per day. Pre-treatment assessment should include an electrocardiogram (Fox and Rieder, 1993; Vinson, 1994), as cardiac
Arhythmiás and sudden cardiac death are side effects (Biederman et al., 1989b; Riddle et al., 1991), and drug levels should be monitored as well as follow-up electrocardiograms (Culbert et al., 1994). Other side effects include blurred vision, irritability, drowsiness, dry mouth, dizziness, appetite changes, constipation, tremor, sleep disturbance, and abdominal cramps (Kelly and Aylward 1992; Fox and Rieder 1993).

Clonidine is another alternative pharmacologic treatment for children with attention deficit disorders (Kelly and Aylward, 1992; Culbert et al., 1994). Clonidine is estimated to have an efficacy rate of 70 per cent (Culbert et al., 1994). The effects of clonidine have been on inattention, impulsivity, and overactivity without negative cognitive effects (Culbert et al., 1994; Hunt et al., 1985; Hunt et al., 1986). Clonidine is thought to be particular useful in children who are hyperaroused or aggressive and those with tics or Tourette disorder (Kelly and Aylward, 1992; Culbert et al., 1994). The maximal dose of clonidine is 0.1 to 0.3 milligrams per day after slow increases of 0.05 milligram per day every 3 days (Culbert et al., 1994). Kelly and Aylward (1992) state that the maximal dose of clonidine is four to five micrograms per kilogram per day and that it should not be stopped abruptly because of possible rebound hypertension. The major side effects are somnolence and elevated blood pressure (Culbert et al., 1994).

Other medications used in treatment of attention deficit disorders are thioridazine, lithium, and monoamine oxidase inhibitors, but their use in children is not recommended by Culbert et al. (1994) because of their less than optimal risk-to-benefit ratios, except in specific situations noted below.

The above pharmacologic treatment options for children with isolated ADHD may require modification for those with specific comorbidities. For children with attention deficit without hyperactivity or attention deficit hyperactivity disorder predominantly inattentive type, lower doses of methylphenidate may be required than for those with hyperactivity (Culbert et al., 1994). Children with ADHD associated with oppositional defiant disorder or conduct disorder may respond to stimulant therapy but may respond more favorably to clonidine
if they demonstrate episodes of hyperarousal or aggressive behavior (Culbert et al., 1994). One must take care to rule out bipolar or manic-depressive disorder in these children prior to treatment as bipolar children may have better response to lithium (Culbert et al., 1994). If children have depression along with ADHD, a tricyclic antidepressant might be a better medication choice (Culbert et al., 1994; Biederman et al., 1989a). Children who have ADHD with anxiety also may respond well to tricyclic antidepressants (Biederman et al., 1989a) or clonidine (Culbert et al., 1994). For the 60 percent of children with Tourette disorder who have ADHD, clonidine is the medication of choice (Culbert et al., 1994). Those with ADHD and pervasive developmental disorder or autism may benefit from clomipramine or fluoxetine while those with concomitant mental retardation may benefit from the same pharmacologic regimen as those with ADHD alone (Culbert et al., 1994).

Controversial treatments abound in the lay press. Some relate to the role of dietary factors in the etiology of ADHD. The Feingold diet, which purports the etiologic role of food additives in ADHD, has been found ineffective in treatment of ADHD in formal reviews of published studies (Kavale and Forness, 1983; Mattes, 1983; Rimland, 1983).

Follow-up

Children under treatment for ADHD require close follow-up (Kelly and Aylward, 1992; Culbert et al., 1994). At minimum, close phone contact must be maintained with the family during the first several weeks of treatment, particularly if the child is on medication (Mercugliano, in Schwartz, 1990; Culbert et al., 1994). As noted above, if the child is on medication, the child will initially need weekly follow-up to monitor the double-blind placebo-controlled trial of pharmacologic intervention for positive effects, as measured for example by rating scales filled out by both the parents and the teacher, and for side effects (Culbert et al., 1994).

Once the psychological and behavioral baseline therapies are in place, with or without pharmacologic intervention, the next follow-up may be in one month with subsequent follow-up visits at 3- to 4-month
intervals (Culbert et al., 1994). Voeller (1991) suggests that the initial follow-up take place one month after the start of medication therapy. Items for review at follow-up visits include (Culbert et al., 1994):

1. the child's understanding of ADHD
2. issues of self esteem and peer-child, parent-child, and teacher-child relationships
3. medication issues (as noted above)
4. the child's personal strengths and accomplishments
5. home behavior management issues
6. school functioning
7. parent advocacy issues
8. anticipatory guidance
9. provision of appropriate reading materials
10. the multimodal treatment plan

Searight et al. (1995) recommend that a mental status examination be repeated every 3 to 6 months. Voeller (1991) emphasizes that treatment of the child with ADHD is a long-term commitment to monitor the child's school environment and progress and other aspects of the child's life and is not limited to the renewal of prescriptions. Some advocate the use of repeated ratings during the course of therapy to assess efficacy (Culbert et al., 1994), while others feel such assessment is required only if the intervention does not seem to be effective (Voeller, 1991).

**Sentinel events/adverse outcomes**

Adverse outcomes relate to the side effects of pharmacologic intervention and to delay in diagnosis and treatment leading to secondary morbidity for the child and the family, especially in the short term. The side effects of medication therapy are as noted above. Up to 70 percent of children with ADHD become adults with attentional disorders (Culbert et al., 1994). Though Culbert et al. (1994) believe these long-term outcomes are to some degree dependent on the successful implementation of a multimodal treatment plan, Kelly and Aylward (1992) cite a longitudinal study of 100 children with ADHD whose
long-term outcome was affected by intelligence level, academic achievement, conduct problems, social relations, parental psychopathology or family dysfunction, and socioeconomic status and not by therapeutic intervention (Lambert et al., 1987). Culbert et al. (1994) lists the long-term problems in adults as attention problems, "affective lability, difficulty completing tasks, temper problems, impulsivity, and poor stress tolerance." Searight et al. (1995) list as problems among adults with attention deficits poor concentration, cognitive confusion, dysphoric mood, and problems with interpersonal relationships. Vinson (1994) lists in addition drug use disorder and criminality if coupled with antisocial disorder.
## RECOMMENDED QUALITY INDICATORS FOR ATTENTION DEFICIT/HYPERACTIVITY DISORDER

These indicators apply to children age 3 to 18.

### Diagnosis

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Quality of evidence</th>
<th>Literature</th>
<th>Benefits</th>
<th>Comments</th>
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<tr>
<td>1. Before making the diagnosis of ADHD, the health care provider should document a history of inattention or impulsivity/hyperactivity, using input from all of the following: &lt;br&gt; • a rating scale by the parent;*&lt;br&gt; • an interview with the parent;&lt;br&gt; • a rating scale by the teacher;**&lt;br&gt; • communication with the teacher (phone or in person); and&lt;br&gt; • physician observation.</td>
<td>III</td>
<td>Atkins et al., 1985; Gordon, 1989; Biederman et al., 1990; Mercugliano, 1990; Schachar et al., 1990; Voeller, 1991; Kelly and Aylward, 1992; Reiff et al., 1993; APA, 1994; Searight et al., 1995</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Accurate diagnosis of ADHD is important to the treatment of ADHD and requires the presence of the core symptoms. Inattention is one of the core symptoms of ADHD.</td>
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<tr>
<td>2. Before making the diagnosis of ADHD, the health care provider should document: &lt;br&gt; a. that the core symptoms of inattention and impulsivity/hyperactivity happen in more than one setting;</td>
<td>III</td>
<td>APA, 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Accurate diagnosis of ADHD requires the elimination of a primary or comorbid family dysfunction problem or a problem of poor environmental fit of the family and aspects of the home or school with the child. Alternate settings include home, school, and the doctor’s office.</td>
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<td>b. that the core symptoms of inattention and impulsivity/hyperactivity have been of &gt;= 6 months duration;</td>
<td>III</td>
<td>APA, 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Accurate diagnosis of ADHD requires that the child’s inattention or impulsivity/hyperactivity is not due to a transient medical, environmental, or psychiatric problem. In those cases, treatment should be directed at those specific underlying problems.</td>
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<td>c. that the core symptoms of inattention and impulsivity/hyperactivity had been present prior to 7 years of age;</td>
<td>III</td>
<td>APA, 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Age of onset is a requirement of DSM IV diagnostic criteria.</td>
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<td>d. the child’s social functioning, especially with regard to Pervasive Developmental Disorder, by evaluating at least one of the following:  – impairment of social interaction,  – impairment in communication, or  – restricted repetitive and stereotyped patterns of behavior, interests, and activities;</td>
<td>III</td>
<td>APA, 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. DSM IV specifically requires the elimination of Pervasive Developmental Disorder as the primary condition.</td>
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<td>e. the presence or absence of affective symptoms;***</td>
<td>III</td>
<td>Weinberg and Emslie, 1991; Brent, 1993; Reiff et al., 1993; APA, 1994; Seearight et al., 1995</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. DSM IV specifically requires the elimination of a mood disorder as the primary condition. The presence of affective symptoms may point to the presence of depression or some other mood disorder. Whether primary or secondary, any attention disorder will be less problematic to treat if the mood disorder is treated also. It is adequate to specify that no affective symptoms are present.</td>
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<td>f. the child’s social functioning, especially with regard to:  – Oppositional Defiant Disorder†  – Conduct Disorder.‡</td>
<td>III</td>
<td>Reiff et al., 1993; APA, 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. Accurate diagnosis of ADHD as the primary or comorbid disorder requires the elimination of a primary disruptive behavior disorder with secondary hyperactivity, such as Oppositional Defiant Disorder or Conduct Disorder. Whether primary or secondary, any attention disorder will be less problematic to treat if any other disruptive disorders are adequately treated.</td>
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<td>3. The health care provider should document that past medical history was reviewed, including birth history, and history of accidents.</td>
<td>III</td>
<td>Reiff et al., 1993</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. The health care provider should rule out a medical reason for poor attention. A history of accidents may suggest impulsivity.</td>
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<td>4. The health care provider should document that a review of systems was done.</td>
<td>III</td>
<td>Weinberg and Emslie, 1991; Reiff et al., 1993</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. The health care provider should rule out a medical reason for poor attention and impulsivity/hyperactivity. Though it would be optimal for the health care provider to specifically mention consideration of lead toxicity, thyroid disease, sleep disorders, migraine headache, seizure disorders, and neurodegenerative disease, documentation may only consist of the notation “ROS—negative” even if the appropriate questions were asked.</td>
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<td>5. The health care provider should document the child’s overall development. This may be based on parental-reported developmental milestones, such as social, fine motor/adaptive, language, and gross motor.</td>
<td>III</td>
<td>Voeller, 1991; Kelly and Aylward, 1992</td>
<td>Enhance educational achievement and adaptation. Accurate diagnosis of ADHD requires the elimination of a primary or comorbid developmental problem which may point to a cognitive disorder or specific language disorder. Milestones will be specified as appropriate for age.</td>
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6. The health care provider should document the child’s cognitive level and academic achievement levels, including:
   a. academic performance;
   b. cognitive level,††
   c. achievement level (only for school-age children).‡‡

III Lamden, 1990; Mercugliano, 1990; Voeller, 1991; Kelly and Aylward, 1992 Reiff et al., 1993; Searight et al., 1995


Accurate diagnosis of ADHD requires the elimination of a primary or comorbid cognitive disorder or learning disorder. For the child older than three years of age, the health care provider may refer the child to the public school system for an Individual Education Program (IEP) assessment, mandated by federal Public Law 94-142.

7. The health care provider should document the structure of the family, home environment, and school environment. Such information should include:

   a. Parents or guardians and other household members,

III Kelly and Aylward, 1992; Reiff et al., 1993


Accurate diagnosis of ADHD requires the elimination of a primary or comorbid family dysfunction problem or a problem of poor environmental fit of the family and aspects of the home or school with the child. Whether primary or secondary, any attention disorder will be less problematic to treat if the family is well functioning and the environments in which the child functions is structured to aid in modifying the child's behavior. For reasons of confidentiality, environmental stressors may be documented in the medical record simply as “stressor present” or “stressor not present.”

   b. environmental stressors,

Information on environmental stressors should include: financial status of family, current illnesses, marital difficulties, and stability of living arrangements.

   c. family functioning, and

Information on family functioning should include: parental beliefs about child’s behavior, parental expectations for child’s behavior, parental explanations for child’s behavior, family activities, how family members get along, family members’ support of each other, perceived family weaknesses, and parental beliefs about child discipline.

   d. school features.

Information on school features should include: involvement of school official other than teacher, grade level or special education, number of children or teacher-student ratio, locations of child’s seat in class, and teacher’s beliefs about child discipline.
8. The health care provider should document the presence or absence of any family history of:
   - psychiatric disorder, specifically
     - depression,
     - anxiety,
     - psychosis,
     - substance abuse, or
     - antisocial behavior;
   - attention deficit hyperactivity disorder; or
   - learning disorder

   III Voeller, 1991; Weinberg and Emslie, 1991; Reiff et al., 1993


   The presence of a family history of learning disorder, behavioral problem, or psychiatric disorder would be significant since such conditions can be familial and are within the differential diagnosis of ADHD and may indicate a source of family stress.

9. The health care provider should document a family history of medical conditions.

   III Kelly and Aylward, 1992; Reiff et al., 1993


   Knowledge of family medical conditions will lead to consideration of other primary diagnoses and may indicate source of family stress.

10. The physical examination should include a neurologic exam and observation of mood and social interactions.

    III Kelly and Aylward, 1992; Reiff et al., 1993


    Accurate diagnosis of ADHD requires a thorough physical examination to aid in ruling out medical causes of inattention and impulsivity/hyperactivity. Various neurologic and psychiatric conditions need to be considered, such as seizure disorder, migraine headache, neurodegenerative processes, mood disorders, Pervasive Developmental Disorder, etc.

11. The health care provider should document the child's current medications.

    III Mercugliano, 1990; Voeller, 1991


    Accurate diagnosis of ADHD requires the elimination of a primary or comorbid pharmacologic side effect problem. Whether primary or secondary, any attention disorder will be less problematic to treat if any problems with substance or medication side effects are treated.

12. The health care provider should document the presence or absence of alcohol and illicit drug use by the child.

    III Mercugliano, 1990; Voeller, 1991


    Accurate diagnosis of ADHD requires the elimination of a primary or comorbid substance abuse side effect problem. Whether primary or secondary, any attention disorder will be less problematic to treat if any problems with substance or medication side effects are treated.

13. If the child is on theophylline, the health care provider should check a theophylline level.

    III Mercugliano, 1990; Voeller, 1991


    A side effect of theophylline is agitation.

14. If the theophylline level is high (>15 mg/ml), the dose should be reduced.

    III Mercugliano, 1990; Voeller, 1991


    A side effect of theophylline is agitation.
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<td>15.</td>
<td>The health care provider should document a vision screening test.</td>
<td>III</td>
<td>Kelly and Aylward, 1992; Reiff et al., 1993</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
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<td>16.</td>
<td>If a vision problem exists, the health care provider should refer for evaluation and treatment, e.g., ophthalmologic or optometric care.</td>
<td>III</td>
<td>Kelly and Aylward, 1992; Reiff et al., 1993</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
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<tr>
<td>17.</td>
<td>The health care provider should document a hearing screening test.</td>
<td>III</td>
<td>Kelly and Aylward, 1992; Reiff et al., 1993</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
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<td>18.</td>
<td>If a hearing problem exists, the health care provider should refer for evaluation and treatment, e.g., audiologic and/or otolaryngologic care.</td>
<td>III</td>
<td>Kelly and Aylward, 1992; Reiff et al., 1993</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
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<td>Indicator</td>
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<td>Literature</td>
<td>Benefits</td>
<td>Comments</td>
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| 19. The health care provider should document efforts to adjust the home and school environments. These adjustments would include:  
  a. at home  
    - predictable schedule for bed time, meal times, play times, and homework,  
    - breakdown of chores into smaller tasks,  
    - predictable acceptable limits of behavior, and  
    - predictable and immediate consequences for inappropriate behavior; and  
  b. at school (any 1)  
    - a seat with minimal distractions,  
    - allow child to get up periodically from seat,  
    - brief instructions,  
    - frequent reminders to stay on task with discrete cues or signs,  
    - predictable and immediate consequences for inappropriate behavior, and  
    - provide opportunities for success. | III | Whalen, 1979; Kelly and Aylward, 1992; Culbert et al., 1994; Vinson, 1994 | Reduce risk of medication side effects. | A subset of children with ADHD may respond sufficiently to environmental modifications to forego the need for pharmacotherapy or more intense psychologic intervention. |
| 20. If the child has isolated ADHD, the health care provider should initiate or refer for behavioral modification including any of the following techniques:  
  • positive reinforcement,  
  • negative consequences, or  
  • response cost. | III | Pelham and Murphy, 1986; Voeller, 1991; Culbert et al., 1994; Searight et al., 1995 | Reduce risk of medication side effects. Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. | A subset of children with ADHD may respond sufficiently to behavioral modification to lessen the need for medication. |
| 21. If a child has oppositional-defiant disorder or conduct disorder, the child should be referred for psychiatric or psychologic therapy. | III | Pliszka, 1991; Kelly and Aylward, 1992; Culbert et al., 1994 | Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. Decrease disruptive behaviors. | The health care provider must treat any other disruptive behaviors in addition to ADHD. |
| 22. If the child has a mood disorder, the child should be referred for psychiatric or psychologic therapy. | III | Pliszka, 1991; Kelly and Aylward, 1992; Culbert et al., 1994 | Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. Decrease affective symptoms. | The health care provider must treat the mood disorder in addition to ADHD. |
| 23. If the child has a learning disorder, the child should receive psychoeducational intervention. | III | Pliszka, 1991; Kelly and Aylward, 1992; Culbert et al., 1994 | Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. Enhance educational achievement. | The health care provider must treat the learning disorder in addition to ADHD. |
24. The health care provider should never prescribe stimulant pharmacotherapy for a child less than three years of age. Reduce risk of medication side effects. The diagnosis of ADHD is almost impossible to confirm in the child less than three years of age. The risk of side effects is greater in the child less than three years of age.

25. If the child has ADHD without a comorbidity and is started on pharmacotherapy, the initial medication choice should be a stimulant such as methylphenidate, dextroamphptamine, or pemoline. Improve short-term behavioral outcomes. Reduce serious medication side effects. Searight et al. (1995) is the only review which states outright that stimulants appear more effective than other classes of medication for treatment of ADHD while the other reviews note that the stimulants are the most commonly prescribed for ADHD and have had the greatest experience of use. Kavale (1982) presents the most convincing review, a meta-analysis based on controlled studies of at least level II-1, demonstrating the effectiveness of stimulant therapy on short-term behavioral outcomes.

26. If a child has ADHD and oppositional-defiant disorder or conduct disorder and is started on pharmacotherapy, the child should be started on a stimulant medication, such as methylphenidate, pemoline, or dextroamphetamine. Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. The pharmacotherapeutic treatment of a child with ADHD and oppositional-defiant disorder or conduct disorder is the same as for isolated ADHD.

27. If the child has ADHD and Tourette Syndrome or a tic disorder and is begun on pharmacotherapy, the child should be started on clonidine or stimulant medication (methylphenidate, pemoline, or dextroamphetamine). Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. In children with ADHD and Tourette Syndrome or a tic disorder stimulant medications may exacerbate the tic disorder.

28. If the child has ADHD and a mood disorder and is begun on pharmacotherapy, the child should be started on a tricyclic antidepressant. Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. Decrease affective symptoms. In children with ADHD and mood disorder tricyclic antidepressants are more effective than stimulant medications.

29. If the child has ADHD and a learning disorder and is begun on pharmacotherapy, the child should be started on a stimulant medication, such as methylphenidate, pemoline, or dextroamphetamine. Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. Enhance educational achievement. The pharmacotherapeutic treatment of a child with ADHD and learning disorder is the same as for isolated ADHD.

30. If the child is started on pharmacotherapy, the health care provider should document that the risks and benefits have been explained to the child, guardian, and teacher. Optimize positive effects on behavior. Minimize the risk of side effects. Knowledge of the benefits will aid the child, parent, and teacher in reporting the positive effects of pharmacotherapy in monitoring optimal dosing of medication. Knowledge of the risks will aid the child, parent, and teacher in assisting the health care provider to modify pharmacotherapy.
| 31. | Before a child is started on stimulant medication such as methylphenidate, dextroamphetamine, or pemoline, the health care provider should document the weight, height, pulse, and blood pressure of the child. | III | Barkley, et al., 1990 | Minimize the risk of side effects. | The health care provider will monitor pharmacotherapy in terms of side effects to aid in adjusting medication dosages. |
| 32. | If a child is started on pemoline, the health care provider should document the absence of hepatic disease prior to the start of therapy by history and baseline liver function tests. | III | Kelly and Aylward, 1990; Searight et al., 1995 | Avoid hepatic toxicity. | The health care provider should take care not to prescribe pemoline to a child with liver disease. |
| 33. | If a child is started on a tricyclic antidepressant, the health care provider should document the absence of cardiac disease by history and by a baseline electrocardiogram. | III | Fox and Rieder, 1993; Vinson, 1994 | Avoid cardiac side effects. | Tricyclic antidepressants may cause arrhythmias and cardiac sudden death. The health care provider should take care not to prescribe tricyclic antidepressants to a child with underlying heart disease, especially an arrhythmia. A baseline electrocardiogram will help to rule out the presence of an arrhythmia and, if normal, will provide a baseline against which to compare monitoring electrocardiograms. |
| 34. | The primary health care provider who is not an ADHD specialist should not prescribe for treatment of ADHD medications other than: • methylphenidate, • pemoline, • dextroamphetamine, • clonidine, or • tricyclic antidepressant. | III | | Avoid adverse medication effects. | General pediatricians and family practitioners may not have sufficient ongoing experience with the use of neurotropic medications. Inadequate experience could increase the risk of adverse side effects. Some feel that the primary care provider should not prescribe clonidine or tricyclic antidepressants without consultation of an ADHD specialist. |
| 35. | The primary health care provider should not simultaneously treat a child with ADHD with more than one medication for treatment of ADHD without the consultation of an ADHD specialist, e.g., a psychiatrist, neurologist, or behavioralist. | III | | Avoid adverse medication effects. | General pediatricians and family practitioners may not have sufficient ongoing experience with the use of multiple neurotropic medications. Inadequate experience could increase risk of adverse effects. |
36. The primary health care provider should request consultation from an ADHD specialist (e.g., a multidisciplinary referral center or psychiatrist, neurologist, or behavioralist) if a child fails to respond to separate trials with methylphenidate, dextroamphetamine, pemoline, clonidine, and a single tricyclic antidepressant.

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<td>37. During the initial evaluation and treatment, the health care provider coordinating care should maintain at least biweekly contact with the family, either through office visits or by phone, for at least 4 contacts.</td>
<td>III</td>
<td>Mercugliano, 1990; Voeller, 1991; Kelly and Aylward, 1992; Culbert et al., 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Close follow-up by the coordinating provider early in the course of diagnosis and treatment will assure the timely completion of required diagnostic tests and implementation of interventions. The exact timing of such follow-up is not specified in most references. Some references suggest weekly follow-up initially. The duration of such frequent follow-up is not specified apart from stabilization of the therapeutic regimen which is difficult to define.</td>
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<td>No.</td>
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<td>Reference(s)</td>
<td>Clinical Effects</td>
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<td>38.</td>
<td>During the initial implementation of behavioral or psychologic treatment, the provider of such services should see the child for office visits on a weekly basis for at least 4 visits.</td>
<td>Mercugliano, 1990; Voeller, 1991; Kelly and Aylward, 1992; Culbert et al., 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Though some references suggest weekly follow-up visits in general, specific recommendations for behavioral or psychologic intervention are not available. One would suppose, however, that close follow-up by the provider of behavioral or psychologic intervention early in the course of such treatment may increase the likelihood of compliance with therapy. The duration of such frequent follow-up is not specified apart from stabilization of the therapeutic regimen which is difficult to define. The literature reports the use of rating scales to monitor the effects of therapy.</td>
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<td>39.</td>
<td>For children receiving behavior or psychologic treatment, after the initial four visits, the healthcare provider coordinating care should see the child in the office every four months.</td>
<td>Culbert et al., 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Monitoring of the child will help to identify positive changes and provide positive reinforcement to the child, parent, and teacher to comply with intervention.</td>
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<td>40.</td>
<td>During the initial implementation of pharmacotherapy, the provider of such services should maintain biweekly contact with the family, either through office visits or by phone, for at least 4 contacts. Office visits should be at least at monthly intervals until improvement is seen in attention or impulsivity/hyperactivity by parent report or rating scale* and, if in school, teacher report or rating scale.**</td>
<td>Mercugliano, 1990; Voeller, 1991; Kelly and Aylward, 1992; Culbert et al., 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function.</td>
<td>Though some references suggest weekly follow-up visits in general, specific recommendations for pharmacotherapeutic intervention are not available. Based on the half-life of the commonly used medications, one would suppose that biweekly visits would be a suitable compromise. Frequent follow-up early in the course of treatment should be helpful in monitoring for side effects and adjustment of dosage. The duration of such frequent follow-up is not specified apart from stabilization of the therapeutic regimen which is difficult to define. This provider may be the same person as the coordinating provider.</td>
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<td>41.</td>
<td>After the initial four visits for pharmacotherapeutic intervention, the provider of such therapy should see the child in the office at least every four months once an improvement is seen in attention or impulsivity/hyperactivity by parent report or rating scale* and, if in school, teacher report or rating scale.**</td>
<td>Culbert et al., 1994</td>
<td>Enhance attention. Decrease impulsivity/hyperactivity. Increase self-esteem. Enhance social function. Reduce medication side effects</td>
<td>Though this recommendation for follow-up is general and not specific to pharmacotherapeutic intervention, such follow-up would seem necessary to monitor for side effects or diminishing behavioral effects. The literature reports the use of rating scales to monitor the effects of pharmacotherapy. This provider may be the same person as the coordinating provider.</td>
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| 42. If a change in therapy has occurred, the health care provider initiating the change must:  
a. evaluate the effect of the change within two weeks, either by an office visit or by phone contact, and  
b. inform the provider coordinating care about the change. | III | Mercugliano, 1990; Voeller, 1991; Kelly and Aylward, 1992; Culbert et al., 1994 | Close follow-up will allow monitoring of behavioral changes and side effects to allow more effective adjustment of therapy, including medication dosage. |
| 43. At each follow-up visit, the health care provider should document the child's behavior both at home and at school by parent report or rating scale* and, if in school, teacher report or rating scale.** | III | Winsberg, 1982; Barkley, 1985; Voeller, 1991; Culbert et al., 1994 | The main effects of therapy appear to be on the core behaviors of inattention and impulsivity/hyperactivity, so those behaviors should be monitored. The literature reports the use of rating scales to monitor the effects of pharmacotherapy. |
| 44. The health care provider should request and review the child's academic records, such as report cards or interviews with the child's teacher, at least once a year. | III | Voeller, 1991; Culbert et al., 1994 | Some studies indicate that therapy for ADHD may have positive effects on academic performance, and so academic performance should also be monitored. |
| 45. If medications have been prescribed, at each follow-up visit the health care provider should document:  
a. weight,  
b. height,  
c. pulse, and  
d. blood pressure. | III | Klein, 1988; Barkley et al., 1990; Culbert et al., 1994 | Monitoring side effects of stimulant therapy will aid the health care provider in monitoring the need for modifications in pharmacotherapy. |
<p>| 46. If stimulant medications have been prescribed, the health care provider should document at each follow-up visit the presence or absence of side effects. | III | Culbert et al., 1994 | Monitoring side effects of pharmacotherapy will aid the health care provider in monitoring the need for modifications in pharmacotherapy. It is sufficient to state &quot;no side effects&quot; or only to mention one side effect. Side effects include any of the following: tics, decreased appetite, insomnia, headaches, or stomach aches. |
| 47. If a tricyclic antidepressant has been prescribed, the health care provider should document at each follow-up visit the presence or absence of side effects. | III | Kelly and Aylward, 1992; Fox and Rieder, 1993; Searight et al., 1995 | Monitoring side effects of tricyclic antidepressant therapy will aid the health care provider in monitoring the need for modifications in pharmacotherapy. In addition to the side effects of dizziness and drowsiness, anticholinergic side effects may be seen. The listed symptoms may indicate an underlying cardiac side effect. |
| 48. If clonidine has been prescribed, the health care provider should document at each follow-up visit the presence or absence of side effects. | III | Culbert et al., 1994; Searight et al., 1995 | Monitoring side effects of clonidine therapy will aid the health care provider in monitoring the need for modifications in pharmacotherapy. The symptoms of dizziness and drowsiness may indicate an underlying cardiac side effect. |</p>
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<td>49.</td>
<td>If the child is on pemoline, the health care provider should assess liver function every six months.</td>
<td>III</td>
<td>Nehra et al., 1990; Pratt and Dubois, 1990; Culbert et al., 1994</td>
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<td></td>
<td>Reduce risk of hepatotoxicity.</td>
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<td>Since pemoline is hepatotoxic, the health care provider must monitor for this complication. None of the references specify the exact frequency of monitoring required.</td>
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<td>50.</td>
<td>If the child is on a tricyclic antidepressant, the health care provider should order an electrocardiogram every six months.</td>
<td>III</td>
<td>Fox and Rieder, 1993; Culbert et al., 1994</td>
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<td></td>
<td>Avoid continued or more serious side effects of tricyclic medications.</td>
<td></td>
<td>Monitoring side effects of tricyclic antidepressant therapy will aid the health care provider in monitoring the need for modifications in pharmacotherapy. None of the references specify the exact frequency of monitoring required.</td>
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*Acceptable parent rating scales include: ADHD Rating Scale; Swanson, Nolan, and Pelham Rating Scale; Child Behavior Check List; Conners Scales; Yale Children’s Inventory; or Aggregate Neurobehavioral Student Health and Education Review.

**Acceptable teacher rating scales include: ADHD Rating Scale; Swanson, Nolan, and Pelham Rating Scale; Child Behavior Check List; ADD-H Comprehensive Teacher Rating Scale; Conners Scales; Yale Children’s Inventory; or Aggregate Neurobehavioral Student Health and Education Review.

***Affective symptoms include: unexplained somatic complaints; drop in school performance; apathy and loss of interest; social withdrawal; increased irritability or tearfulness; sleep changes; appetite changes; suicidal ideation or behavior; substance use; promiscuous sexual behavior; or risk-taking behavior.

†Oppositional Defiant Disorder symptoms include: negativistic, hostile, and defiant behavior.

‡Conduct Disorder symptoms include: aggression to people and animals, destruction of property, deceitfulness or theft, and serious violations of rules.

††Cognitive level may be measured using the Wechsler Scales of Intelligence-III, Kaufman Assessment Battery for Children, Stanford-Binet, or an alternative measure of cognitive function specified by child’s school district.

‡‡Achievement level for school-age children may be measured using the Woodcock-Johnson Psycho-educational Battery or the Wide Range Achievement Test-Revised.

Quality of Evidence Codes:

I: RCT
II-1: Nonrandomized controlled trials
II-2: Cohort or case analysis
II-3: Multiple time series
III: Opinions or descriptive studies
REFERENCES – ATTENTION DEFICIT/HYPERACTIVITY DISORDER


Pelham WE, J Sturges, J Hoza, et al. 1987. Sustained release and standard methylphenidate effects on cognitive and social behavior


