

Practice Parameters for the Assessment and Treatment of Children, Adolescents, and Adults with Attention-Deficit/Hyperactivity Disorder

Attention-deficit/hyperactivity disorder (ADHD) is a common neuropsychiatric syndrome affecting children and adolescents. This syndrome may be associated with a number of comorbid psychiatric conditions as well as with impaired academic performance and with both patient and family emotional distress. ADHD is characterized by symptoms of inattentiveness and/or hyperactivity-impulsivity which are not appropriate to the child's age. This disorder usually manifests by age 3 and affects up to 6% of school-age children. Although the etiology is unknown, ADHD appears to have a strong genetic component and to involve dysregulation of the CNS dopaminergic system. Pharmacological treatment, especially with psychostimulant medication, is the most studied aspect of management, although other forms of treatment (e.g., behavior therapy, parent training) are essential components of proper clinical care.

Diagnostic Criteria

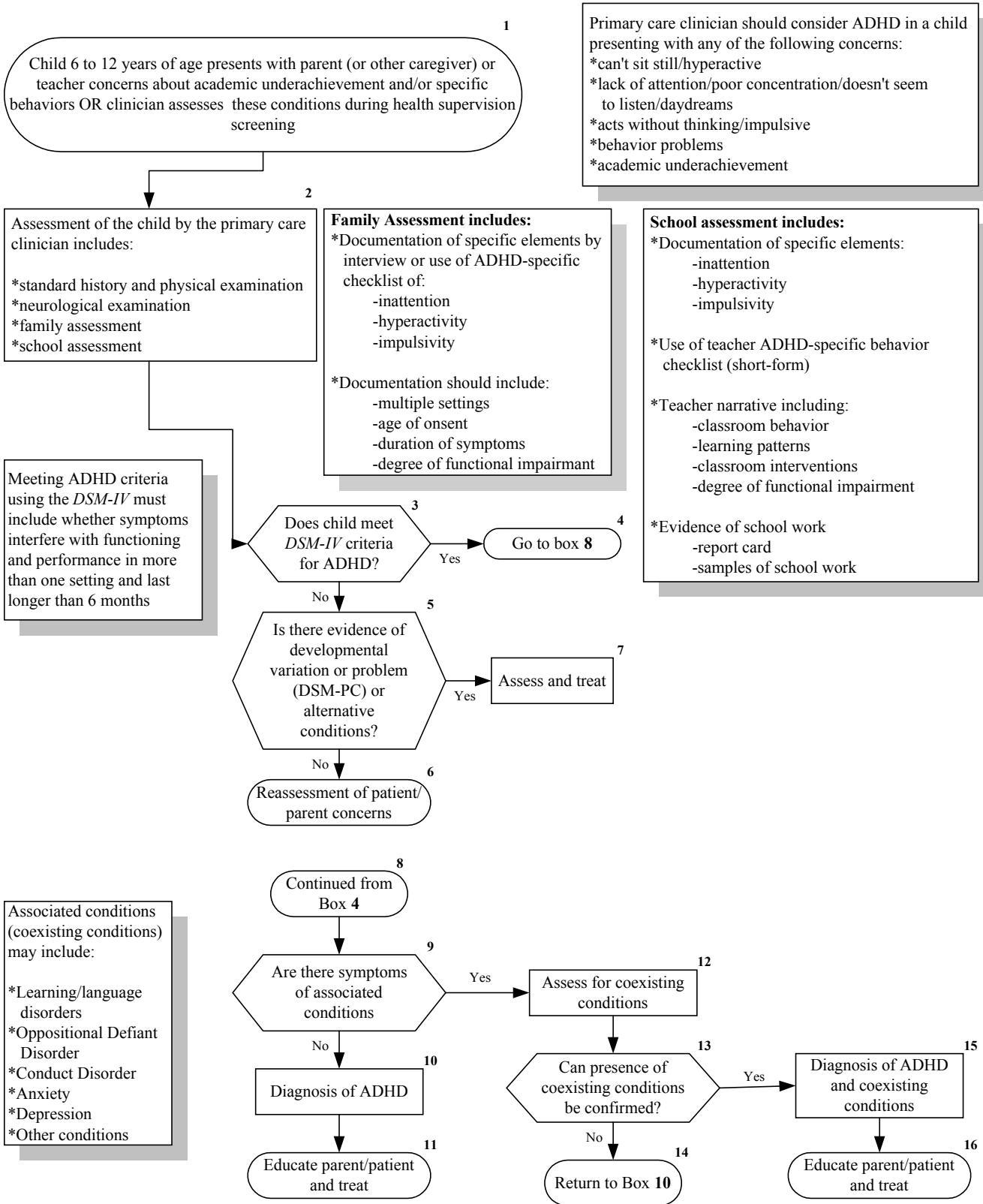
ADHD is defined by the American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (*DSM-IV*), as persistent inattentive and/or hyperactive behaviors that are not age-appropriate.¹ These behaviors are pervasive, as demonstrated by their presence in at least 2 environments (e.g., school and home), and are sufficiently severe to interfere with social or academic functioning. To meet *DSM-IV* criteria (see Table 1), patients must demonstrate symptoms of ADHD before the age of 7 years, and symptoms must have been ongoing for longer than 6 months, ensuring that persistent rather than transient symptoms will be included.

Table 1. Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder*

| |
|---|
| <p>A. Either (1) or (2):</p> <ol style="list-style-type: none">1. inattention: 6 (or more) of the following symptoms of inattention have persisted for at least 6 mo to a degree that is maladaptive and inconsistent with developmental level:<ol style="list-style-type: none">(a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities(b) often has difficulty sustaining attention in tasks or play activities(c) often does not seem to listen when spoken to directly(d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)(e) often has difficulty organizing tasks and activities(f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)(g) often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)(h) is often easily distracted by extraneous stimuli(i) is often forgetful in daily activities2. hyperactivity-impulsivity: 6 (or more) of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 mo to a degree that is maladaptive and inconsistent with developmental level:<ol style="list-style-type: none">(a) often fidgets with hands or feet or squirms in seat(b) often leaves seat in classroom or in other situations in which remaining seated is expected.(c) 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)(d) Often has difficulty laying or engaging in leisure activities quietly(e) Is often "on the go" or often acts as if "driven by a motor"(f) Often talks excessively(g) Often blurts out answers before questions have been completed(h) Often has difficulty awaiting turn(i) Often interrupts or intrudes on other (e.g., butts into conversations or games) <p>B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7</p> <p>C. Some impairment from the symptoms is present in 2 or more settings (e.g., butts into conversations or games)</p> <p>D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning</p> <p>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 (e.g., mood disorder, anxiety disorder, dissociative disorder, or a personality disorder)</p> |
|---|

*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, code based on type:314.01 Attention-Deficit/Hyperactivity Disorder, Combined Type: if both criteria A(1) and A(2) are met for the past 6 months; 314.00 Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type: if criterion A(1) is met but criterion A(2) is not met for the past 6 months; 314.01 Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type: if criterion A(2) is met but criterion A(1) is not met for the past 6 months. Coding note: For individuals (especially adolescents and adults) who currently have symptoms that no longer meet full criteria, "In partial Remission" should be specified.

Diagnosis and Evaluation of the Child with Attention-Deficit/Hyperactivity Disorder



Depending on the number of symptoms present, ADHD is subclassified as either predominantly inattentive, predominantly hyperactive-impulsive, or both. If at least 6 symptoms of inattentiveness have been present during the previous 6 months, with fewer than 6 symptoms of hyperactivity-impulsivity, then the classification of predominantly inattentive type can be made. The reverse would qualify for the predominantly hyperactive-impulsive type, whereas the combined type requires at least 6 symptoms in each category.¹

Taken as a whole, these criteria require an illness pattern that is enduring and has led to impairment. To make this diagnosis appropriately, the clinician must be familiar with normal development and behavior, gather information from several sources to evaluate the child's symptoms in different settings, and construct an appropriate differential diagnosis for the existing complaints.²

The diagnosis of "primary" ADHD is made when there is no evidence from the history, physical examination, or laboratory findings of another condition producing the clinical scenario.

The goals of the actual examination of the child are to determine whether he or she meets diagnostic criteria and to look for conditions other than ADHD that might simulate it. Too much focus on a child's behavior in the physician's office or the child's own observations may lead to a missed diagnosis, while over-reliance on parental reports of abnormal behavior alone may lead to overdiagnosis.^{3,4}

The overall approach to diagnosis should involve:

1. A comprehensive interview with the child's adult caregiver;
2. A mental status examination of the child;
3. A medical evaluation for general health and neurologic status;
4. A cognitive assessment of ability and achievement;
5. Use of ADHD-focused parent and teacher rating scales; and
6. School reports and other adjunctive evaluations if necessary (speech, language assessment, etc) depending on clinical findings.^{7, 8, 9}

An evaluation can be performed by a clinician with the skills and knowledge to carry out those components.

Recently, the American Academy of Pediatrics, committee on quality improvement, subcommittee on Attention-Deficit Hyperactivity Disorder has published a clinical practice guideline on the diagnosis, evaluation, and treatment of the child with ADHD.^{39,40} The guidelines contain the following recommendations for diagnosis of ADHD:

1. In a child 6 to 12 years old who presents with inattention, hyperactivity, impulsivity, academic under achievement, or behavior problems, primary care practitioners should initiate an evaluation for ADHD;
2. The diagnosis of ADHD requires that a child meet *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* criteria;
3. The assessment of ADHD requires evidence directly obtained from parents or caregivers regarding the core symptoms of ADHD in various settings, the age of onset, duration of symptoms, and degree of functional impairment;
4. The assessment of ADHD requires evidence directly obtained from the classroom teacher (or other school professional) regarding the core symptoms of ADHD, duration of symptoms, degree of functional impairment, and associated conditions;
5. Evaluation of the child with ADHD should include assessment for associated (coexisting) conditions;

6. Other diagnostic tests are not routinely indicated to establish the diagnosis of ADHD but may be used for the assessment of other coexisting conditions (e.g., learning disabilities and mental retardation).

Teachers, parents, and child health professionals typically encounter children with behaviors relating to activity, impulsivity, and attention who may not fully meet *DSM-IV* criteria. The *Diagnostic and Statistical Manual for Primary Care (DSM-PC), Child and Adolescent Version*, provides a guide to the more common behaviors seen in pediatrics.

The manual describes common variations in behavior, as well as more problematic behaviors, at levels less than those specified in the *DSM-IV* (and with less impairment). The behavioral descriptions of the *DSM-PC* have not yet been tested in community studies to determine the prevalence or severity of developmental variations and moderate problems in the areas of inattention and hyperactivity or impulsivity. They do, however, provide guidance to clinicians in the evaluation of children with these symptoms and help to direct clinicians to many elements of treatment for children with problems with attention, hyperactivity, or impulsivity (Table 2 and 3). The *DSM-PC* also considers environmental influences on a child's behavior and provides information on differential diagnosis with a developmental perspective.

Table 2

DSM-PC: Developmental Variation: Impulsive/Hyperactive Behaviors

| Developmental Variation | Common Developmental Presentations |
|---|---|
| V65.49 Hyperactive/impulsive variation Young children in infancy and in the preschool years are normally very active and impulsive and may need constant supervision to avoid injury. Their constant activity may be stressful to adults who do not have the energy or patience to tolerate the behavior. During school years and adolescence, activity may be high in play situations and impulsive behaviors may normally occur, especially in peer pressure situations. High levels of hyperactive/impulsive behavior do not indicate a problem or disorder if the behavior does not impair function. | <i>Early childhood</i> The child runs in circles, doesn't stop to rest, may bang into objects or people, and asks questions constantly. <i>Middle childhood</i> The child plays active games for long periods. The child may occasionally do things impulsively, particularly when excited. <i>Adolescence</i> The adolescent engages in active social activities (e.g., dancing) for long periods, may engage in risky behaviors with peers. |

Special Information

Activity should be thought of not only in terms of actual movement, but also in terms of variations in responding to touch, pressure, sound, light, and other sensations. Also, for the infant and young child, activity and attention are related to the interactions between the child and caregiver, e.g., when sharing attention and playing together.
Activity and impulsivity often normally increase when the child is tired or hungry and decrease when sources of fatigue or hunger are addressed.
Activity normally may increase in new situations or when the child may be anxious. Familiarity then reduces activity.
Both activity and impulsivity must be judged in the context of the caregiver's expectations and the level of stress experienced by the caregiver. When expectations are unreasonable, the stress level is high, and/or the parent has an emotional disorder (especially depression), the adult may exaggerate the child's level of activity/impulsivity.
Activity level is a variable of temperature. The activity level of some children is on the high end of normal from birth and continues to be high throughout their development.

Taken from: American Academy of Pediatrics. *The Classification of Child and Adolescent Mental Diagnoses in Primary Care. Diagnostic and Statistical Manual for Primary Care (DSM-PC), Child and Adolescent Version*. Elk Grove Village, IL: American Academy of Pediatrics; 1996

Table 3

DSM-PC: Developmental Variation: Inattentive Behaviors

| Developmental Variation | Common Developmental Presentations |
|---|---|
| <p><i>V65.49 Inattention variation</i> A young child will have a short attention span that will increase as the child matures. The inattention should be appropriate for the child's level of development and not cause any impairment.</p> | <p><i>Early childhood</i> The preschooler has difficulty attending, except briefly, to a storybook or a quiet task such as coloring or drawing.</p> <p><i>Middle childhood</i> The child may not persist very long with a task the child does not want to do such as read an assigned book, homework, or a task that requires concentration such as cleaning something.</p> <p><i>Adolescence</i> The adolescent is easily distracted from tasks he or she does not desire to perform.</p> |
| Special Information | |
| <p>Infants and preschoolers usually have very short attention spans and normally do not persist with activities for long, so that diagnosing this problem in younger children may be difficult. Some parents may have a low tolerance for developmentally appropriate inattention.</p> <p>Although watching television cartoons for long periods of time appears to reflect a long attention span, it does not reflect longer attention spans because most television segments require short (2- to 3-minute) attention spans and they are very stimulating.</p> <p>Normally, attention span varies greatly depending upon the child's or adolescent's interest and skill in the activity, so much so that a short attention span for a particular task may reflect the child's skill or interest in that task.</p> | |

Taken from: American Academy of Pediatrics. *The Classification of Child and Adolescent Mental Diagnoses in Primary Care. Diagnostic and Statistical Manual for Primary Care (DSM-PC), Child and Adolescent Version*. Elk Grove Village, IL: American Academy of Pediatrics; 1996

Specific questionnaires and rating scales have been developed to review and quantify the behavioral characteristics of ADHD (Table 4). The ADHD- specific questionnaires and rating scales have been shown to have an odds ratio greater than 3.0 (equivalent to sensitivity and specificity greater than 94%) in studies differentiating children with ADHD from normal, age-matched, community controls. Thus, ADHD-specific rating scales accurately distinguish between children with and without the diagnosis of ADHD. Almost all studies of these scales and checklists have taken place under ideal conditions, i.e., comparing children in referral sites with apparently healthy children. These instruments may function less well in primary care clinicians' offices than indicated in the tables. In addition, questions on which these rating scales are based are subjective and subject to bias. Thus, their results may convey a false sense of validity and must be interpreted in the context of the overall evaluation of the child. Whether these scales provide additional benefit beyond careful clinical assessment informed by *DSM-IV* criteria is not known.

Table 4

Total ADHD-Specific Checklists: Ability to Detect ADHD vs Normal Controls

| Study | Behavior Rating Scale | Age | Gender | Effect Size | 95% Confidence Limits |
|----------------|--|-------|--------|-------------|-----------------------|
| Conners (1997) | CPRS-R:L-ADHD Index (Conners Parent Rating Scale—1997 Revised Version: Long Form, ADHD Index Scale) | 6 -17 | MF | 3.1 | 2.5, 3.7 |
| Conners (1997) | CTRS-R:L-ADHD Index (Conners Teacher Rating Scale—1997 Revised Version: Long Form, ADHD Index Scale) | 6 -17 | MF | 3.3 | 2.8, 3.8 |
| Conners (1997) | CPRS-R:L- <i>DSM-IV</i> Symptoms (Conners Parent Rating Scale—1997 Revised Version: Long Form, <i>DSM-IV</i> Symptoms Scale) | 6 -17 | MF | 3.4 | 2.8, 4.0 |
| Conners (1997) | CTRS-R:L- <i>DSM-IV</i> Symptoms (Conners Teacher Rating Scale—1997 Revised Version: Long Form, <i>DSM-IV</i> Symptoms Scale) | 6 -17 | MF | 3.7 | 3.2, 4.2 |
| Breen (1989) | SSQ-O-I Barkley's School Situations Questionnaire-Original Version, Number of Problem Settings Scale | 6 -11 | F | 1.3 | 0.5, 2.2 |
| Breen (1989) | SSQ-O-II Barkley's School Situations Questionnaire-Original Version, Mean Severity Scale | 6 -11 | F | 2.0 | 1.0, 2.9 |
| Combined | | | | 2.9 | 2.2, 3.5 |

Taken from: Green M, Wong M, Atkins D, et al. *Diagnosis of Attention Deficit/Hyperactivity Disorder. Technical Review 3*. Rockville, MD: US Department of Health and Human Services, Agency for Health Care Policy and Research; 1999. AHCPR publication 99-0050

Global, nonspecific questionnaires and rating scales that assess a variety of behavioral conditions, in contrast with the ADHD-specific measures, generally have an odds ratio <2.0 (equivalent to sensitivity and specificity <86%) in studies differentiating children referred to psychiatric practices from children who were not referred to psychiatric practices (Table 5). Thus, these broadband scales do not distinguish well between children with and without ADHD.

Table 5

Total Scales of Broadband Checklists: Ability to Detect Referred vs Non referred

| Study | Behavior Rating Scale | Age | Gender | Effect Size | 95% Confidence Limits |
|------------------------------------|--|------|--------|-------------|-----------------------|
| Achenbach (1991b) | CBCL/4-18-R, Total Problem Scale (Child Behavior Checklist for Ages 4-18, Parent Form) | 4-11 | M | 1.4 | 1.3, 1.5 |
| Achenbach (1991b) | Same as above | 4-11 | F | 1.3 | 1.2, 1.4 |
| Achenbach (1991c) | CBCL/TRF-R, Total Problem Scale (Child Behavior Checklist, Teacher Form) | 5-11 | M | 1.2 | 1.0, 1.4 |
| Achenbach (1991c) | Same as above | 5-11 | F | 1.1 | 1.0, 1.3 |
| Naglieri, LeBuffe, Pfeiffer (1994) | DSMD-Total Scale (Devereaux Scales of Mental Disorders) | 5-12 | MF | 1.0 | 0.8, 1.3 |
| Conners (1997) | CPRS-R:L-Global Problem Index (1997 Revision of Conners Parent Rating Scale, Long Version) | — | MF | 2.3 | 1.9, 2.6 |
| Conners (1997) | CTRS-R:L-Global Problem Index (1997 Revision of Conners Teacher Rating Scale, Long Version) | — | MF | 2.0 | 1.7, 2.3 |
| Combined | | | | 1.5 | 1.2, 1.8 |

Taken from: Green M, Wong M, Atkins D, et al. *Diagnosis of Attention Deficit/Hyperactivity Disorder. Technical Review 3*. Rockville, MD: US Department of Health and Human Services, Agency for Health Care Policy and Research; 1999. AHCPR publication 99-0050.

The new AAP guideline also contains the following recommendations for the treatment of a child diagnosed with ADHD:

- Primary care clinicians should establish a treatment program that recognizes ADHD as a chronic condition.
- The treating clinician, parents, and child, in collaboration with school personnel, should specify appropriate target outcomes to guide management.
- The clinician should recommend stimulant medication and/or behavior therapy as appropriate to improve target outcomes in children with ADHD.
- When the selected management for a child with ADHD has not met target outcomes, clinicians should evaluate the original diagnosis, use of all appropriate treatments, adherence to the treatment plan, and presence of coexisting conditions.
- The clinician should periodically provide a systematic follow-up for the child with ADHD. Monitoring should be directed to target outcomes and adverse effects, with information gathered from parents, teachers, and the child.

The primary care of children with ADHD includes attention to the main principles of care for children with any chronic condition, such as

- Providing information about the condition
- Updating and monitoring family knowledge and understanding on a periodic basis
- Counseling about family response to the condition

- Developmentally appropriate education of the child about ADHD, with updates as the child grows
- Availability to answer family questions
- Ensuring coordination of health and other services
- Helping families set specific goals in areas related to the child's condition and its effects on daily activities
- Linking families with other families with children who have similar chronic conditions as needed and available.

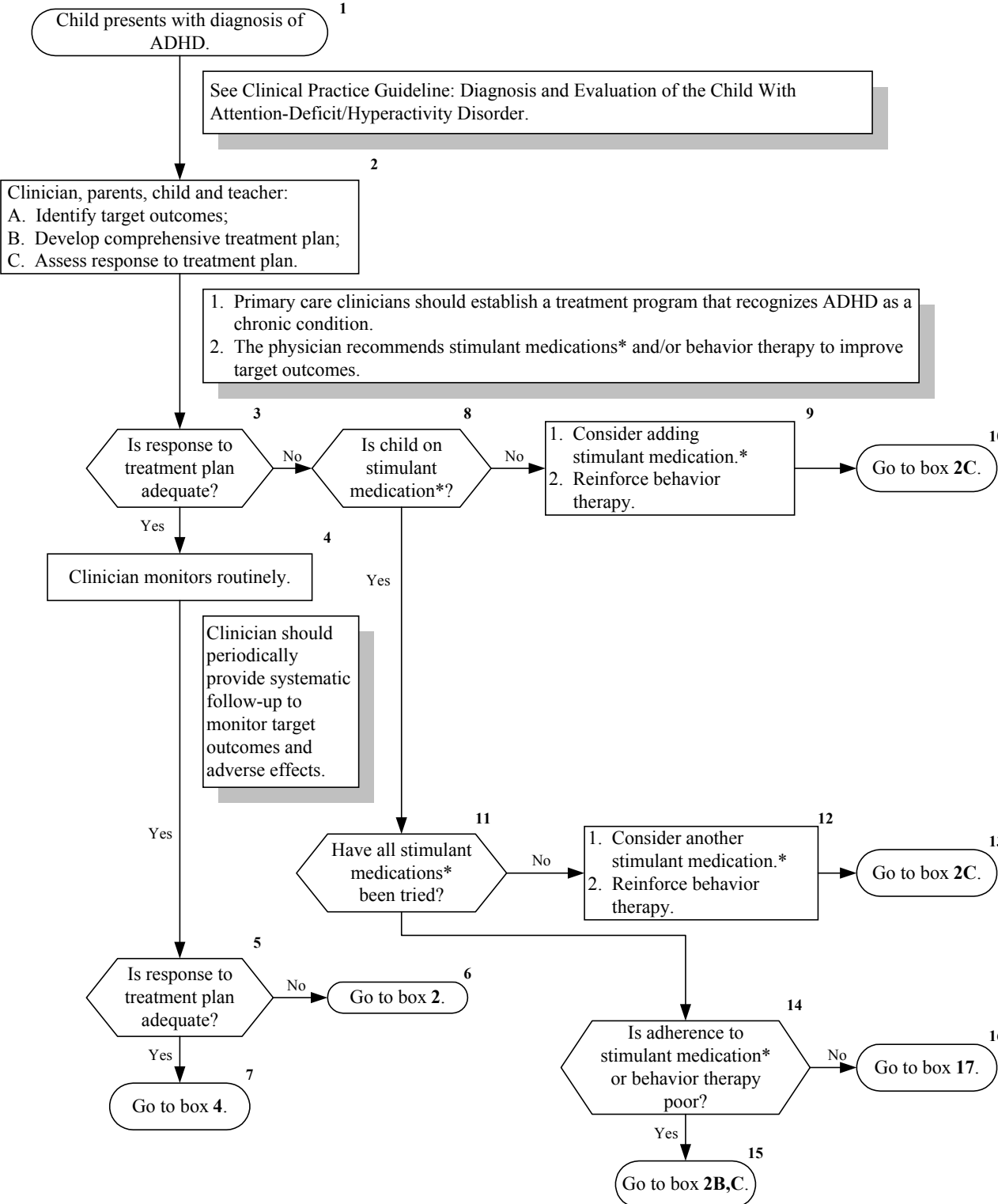
As with other chronic conditions, treatment of ADHD requires the development of child-specific treatment plans that describe methods and goals of treatment and means of monitoring care over time, including specific plans for follow-up.

The core symptoms of ADHD (i.e., inattention, impulsivity, hyperactivity) can result in multiple areas of dysfunction relating to a child's performance in the home, school, or community. The primary goal of treatment should be to maximize function. Desired results include

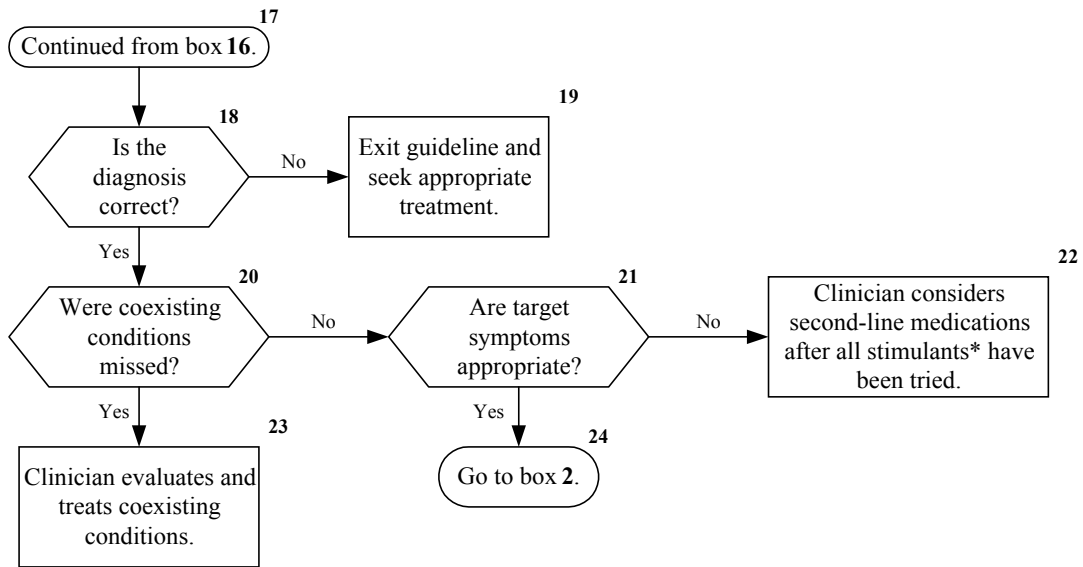
- improvements in relationships with parents, siblings, teachers, and peers
- decreased disruptive behaviors
- improved academic performance, particularly in volume of work, efficiency, completion, and accuracy
- increased independence in self-care or homework
- improved self-esteem
- enhanced safety in the community, such as in crossing streets or riding bicycles. Target outcomes should follow from the key symptoms the child manifests and the specific impairments these symptoms cause.

The process of developing target outcomes requires input from parents, children, and teachers, as well as other school personnel where available and appropriate. They should agree on at least 3 to 6 key targets and desired changes as prerequisites to constructing the treatment plan. The goals should be realistic, attainable, and measurable. The methods of treatment and of monitoring change will vary as a function of the target outcomes.

Algorithm for the treatment of the school-aged child with Attention-Deficit/Hyperactivity Disorder



Algorithm for the treatment of the school-aged child with Attention-Deficit/Hyperactivity Disorder (cont.)



* Excluding Pemoline

Stimulant Medication

Many studies have documented the efficacy of stimulants in reducing the core symptoms of ADHD. In many cases, stimulant medication also improves the child's ability to follow rules and decreases emotional over reactivity, thereby leading to improved relationships with peers and parents. Three formal meta-analyses and 1 review of reviews support the short-term efficacy of stimulant medications in reducing core symptoms of ADHD as well as improving function in a number of domains. The most powerful effects are found on measures of observable social and classroom behaviors and on core symptoms of attention, hyperactivity, and impulsivity.* The effects on intelligence and achievement tests are more modest. Most studies of stimulants have been short-term, demonstrating efficacy over several days or weeks. The MTA study extends the demonstrated efficacy to 14 months. In that study, 579 children 7 to 9.9 years of age with ADHD were randomized to 4 treatment groups: medication management alone, medication and behavior management, behavior management alone, and a standard community care group. The medication management groups followed specific protocols and algorithms in distinction to routine community practice based on clinicians' best judgments. School-aged children with ADHD showed a marked reduction in core ADHD symptoms over a 14-month period when they were treated with medication management alone or a combination of medication and behavior management. Eighty-five percent of the children treated with medication received a stimulant medication. Despite the efficacy of stimulant medications in improving behaviors, many children who receive them do not demonstrate fully normal behavior (e.g., only 38% of medically managed children in the MTA study received scores in the normal range at 1-year follow-up). Although the MTA study demonstrated that efficacy of stimulants lasts at least to 14 months, the longer-term effects of stimulants remain unclear, attributable in part to methodological difficulties in other studies.

Stimulant medications currently available include short-, intermediate-, and long-acting methylphenidate, and short-, intermediate-, and long-acting dextroamphetamine. The latter 2 formulations are mixed amphetamine salts (75% dextroamphetamine and 25% levamphetamine). Pemoline, a long-acting stimulant, is rarely used now because of its rare but potentially fatal hepatotoxicity. Primary care clinicians should not use it routinely, and this guideline does not include it as a first- or second-line treatment for ADHD. Table 6 indicates available medications and their doses. The McMaster report reviewed 22 studies and showed no differences comparing methylphenidate with dextroamphetamine or among different forms of these stimulants. Each stimulant improved core symptoms equally. Individual children, however, may respond to one of the stimulants but not to another. Recommended stimulants require no serologic, hematologic, or electrocardiogram monitoring. Current evidence supports the use of only 2 other medications for ADHD, tricyclic antidepressants and bupropion. Nine studies carefully evaluated tricyclic antidepressants (6 evaluated desipramine, 3 evaluated imipramine); all indicated positive effects on ADHD symptoms. Four trials comparing tricyclic antidepressants with methylphenidate indicated either no differences in response or slightly better results with stimulant use. The use of non-stimulant medications falls outside this practice guideline, although clinicians should select tricyclic antidepressants after the failure of 2 or 3 stimulants and only if they are familiar with their use. Desipramine use has been associated, in rare cases, with sudden death. Clonidine, one of the antihypertensive drugs occasionally used in the treatment of ADHD, also falls outside the scope of this guideline. Limited studies of clonidine indicate that it is better than placebo in the treatment of core symptoms (although with effect sizes lower than those for stimulants). Its use has been documented mainly in children with ADHD and coexisting conditions, especially sleep disturbances.

Unlike most other medications, stimulant dosages usually are not weight dependent. Clinicians should begin with a low dose of medication and titrate upward because of the marked individual variability in the dose-response relationship. The first dose that a child's symptoms respond to may not be the best dose to improve function. Clinicians should continue to use higher doses to achieve better responses. This strategy may require reducing the dose when a higher dose produces side effects or no further improvement. The best dose of medication for a given child is the one that leads to optimal effects with minimal side effects. The dosing schedules vary depending on target outcomes, although no consistent controlled studies compare different

dosing schedules. For example, if there is a need for relief of symptoms only during school, a 5-day schedule may be sufficient. By contrast, a need for relief of symptoms at home and school suggests a 7-day schedule.

Stimulants are generally considered safe medications, with few contraindications to their use. Side effects occur early in treatment and tend to be mild and short-lived. The most common side effects are decreased appetite, stomachache or headache, delayed sleep onset, jitteriness, or social withdrawal. Most of these symptoms can be successfully managed through adjustments in the dosage or schedule of medication. Approximately 15% to 30% of children experience motor tics, most of which are transient, while on stimulant medications. In addition, approximately half of children with Tourette syndrome have ADHD. The effects of medication on tics are unpredictable. The presence of tics before or during medical management of ADHD is not an absolute contraindication to the use of stimulant medications. A review of 7 studies comparing stimulants with placebo or with other medications indicated no increase in tics in children treated with stimulants.

At least 80% of children will respond to one of the stimulants if they are tried in a systematic way. Children who fail to show positive effects or who experience intolerable side effects on one stimulant medication should be tried on another of the recommended stimulant medications. The reasons for this recommendation include the following:

- The finding that most children who fail to respond to one medication will have a positive response to an alternative stimulant
- The safety and efficacy of stimulants in the treatment of ADHD compared with non-stimulant medications
- The numerous crossover trials that indicate the efficacy of different stimulants in the same child
- The idiosyncratic responses to medication

Children who fail 2 stimulant medications can be tried on a third type or formulation of stimulant medication for the same reason.

Table 6**Medications Used in the Treatment of Attention-Deficit/Hyperactivity Disorder**

| Generic Class (Brand Name) | Daily Dosage Schedule | Duration | Prescribing Schedule |
|---|-----------------------|----------|--|
| Stimulants (First-Line Treatment) | | | |
| Methylphenidate | | | |
| Short-acting (Ritalin, Metadate, Methylin) | BID to TID | 3-5 hr | 5-20 mg BID to TID |
| Intermediate-acting (Ritalin SR, Metadate ER, Methylin ER) | QD to BID | 3-8 hr | 20-40 mg QD or 40 mg in the morning and 20 early afternoon |
| Extended Release (Concerta, Metadate CD, Ritalin LA [*]) | QD | 8-12 hr | 18-72 mg QD |
| Amphetamine | | | |
| Short-acting (Dexedrine, Dextrostat) | BID to TID | 4-6 hr | 5-15 mg BID or 5-10 mg TID |
| Intermediate-acting (Adderall, Dexedrine spansule) | QD to BID | 6-8 hr | 5-30 mg QD or 5-15 mg BID |
| Extended Release (Adderall-XR) | QD | | 10-30 mg QD |
| Antidepressants (Second-Line Treatment) | | | |
| Tricyclics (TCAs) | | | |
| Imipramine, Desipramine | BID to TID | | 2-5 mg/kg/day [†] |
| Bupropion | | | |
| (Wellbutrin) | QD to TID | | 50-100 mg TID |
| (Wellbutrin SR) | BID | | 100-150 mg BID |

[†] Prescribing and monitoring information in *Physicians' Desk Reference*.

Tricyclic Antidepressants

Tricyclic antidepressants (TCAs) may be indicated as second-line drugs for patients who do not respond to stimulants or who develop significant side effects on stimulants or for the treatment of ADHD symptoms in patients with tics or Tourette's disorder.^{25,26,27} Patients with ADHD and co-morbid anxiety disorder or depression may respond better to TCAs than to stimulants. However, efficacy in improving cognitive symptoms does not appear as great as for stimulants. Drawbacks include serious potential cardiac side effects, the danger of accidental or intentional overdose, sedation and anticholinergic side effects. Nortriptyline and imipramine are favored in clinical practice over other TCAs in prepubertal children. In any case, TCAs should be used only for clear indications and with careful monitoring of baseline and subsequent vital signs and ECG.²⁹

Selective Serotonin Reuptake Inhibitors

Although there has been considerable clinical interest in the use of selective serotonin reuptake inhibitors (SSRIs) in the treatment of ADHD, the only published data are from one open trial of fluoxetine alone.³⁰ Anecdotal reports do not support efficacy of the SSRIs for the core symptoms of ADHD.

α -Adrenergic Agonists

One small study and clinical experience suggest that clonidine may be useful in modulating mood and activity level and improving cooperation and frustration tolerance in a subgroup of children with ADHD.³¹ Although clonidine is not effective in treating inattention per se, it may be used alone to treat behavioral symptoms of ADHD in children with tics or those who are non-responders or negative responders to stimulants.³² Open trials suggest that it may be most useful in combination with a stimulant, when the stimulant response is only partial, or when the stimulant dose is limited by side effects.³³

Before starting treatment with clonidine, the clinician should take a thorough cardiovascular history, including recent clinical cardiac examination, measurement of pulse and blood pressure, and ECG. History of syncope is a relative contraindication.³⁴

Behavior Therapy

Behavior therapy represents a broad set of specific interventions that have a common goal of modifying the physical and social environment to alter or change behavior. Along with behavior therapy, most clinicians, parents, and schools address a variety of changes in the child's home and school environment, including more structure, closer attention, and limitations of distractions. Such environmental modifications have not undergone careful efficacy assessment, but most treatment plans include them.

Behavior therapy usually is implemented by training parents and teachers in specific techniques of improving behavior. Behavior therapy then involves providing rewards for demonstrating the desired behavior (e.g., positive reinforcement) or consequences for failure to meet the goals (e.g., punishment). Repetitive application of the rewards and consequences gradually shapes behavior. Although behavior therapy shares a set of principles, it includes different techniques with many of the strategies often combined into a comprehensive program.

Behavior therapy should be differentiated from psychological interventions directed to the child and designed to change the child's emotional status (e.g., play therapy) or thought patterns (e.g., cognitive therapy or cognitive-behavior therapy). Although these psychological interventions have great intuitive appeal, they have little documented efficacy in the treatment of children with ADHD, and gains achieved in the treatment setting usually do not transfer into the classroom or home. By contrast, parent training in behavior therapy and classroom behavior interventions have successfully changed the behavior of children with ADHD.

Parent training typically begins with 8 to 12 weekly group sessions with a trained therapist. The focus is on the child's behavior problems and difficulties in family relationships. A typical program aims to improve the parents' or caregivers' understanding of the child's behavior and teaching them skills to deal with the behavioral difficulties posed by ADHD. Programs offer specific techniques for giving commands, reinforcing adaptive and positive social behavior, and decreasing or eliminating inappropriate behavior. Programs plan for maintenance and relapse prevention. Parent training improves the child's functioning and decreases disruptive behavior but (as with stimulant medications) does not necessarily bring the behavior of a child with ADHD into the normal range on parent rating scales.

Classroom management also focuses on the child's behavior and may be integrated into classroom routines for all students or targeted for a selected child in the classroom. Classroom management often begins with increasing the structure of activities. Systematic rewards and consequences, including point systems or use of token economy (see Table 7), are included to increase appropriate behavior and eliminate inappropriate behavior. A periodic (often daily) report card can record the child's progress or performance with regard to goals and communicate the child's progress to the parents, who then provide reinforcers or consequences based on that day's performance. Classroom behavior management also may improve a child's functioning but may not bring the child's behavior into the normal range on teacher behavior rating scales. Table 7 outlines specific behavior therapies that have been demonstrated as effective for ADHD.

Table 7

Effective Behavioral Techniques for Children With Attention-Deficit/Hyperactivity Disorder

| Technique | Description | Example |
|------------------------|---|--|
| Positive reinforcement | Providing rewards or privileges contingent on the child's performance. | Child completes an assignment and is permitted to play on the computer. |
| Time-out | Removing access to positive reinforcement contingent on performance of unwanted or problem behavior. | Child hits sibling impulsively and is required to sit for 5 minutes in the corner of the room. |
| Response cost | Withdrawing rewards or privileges contingent on the performance of unwanted or problem behavior. | Child loses free time privileges for not completing homework. |
| Token economy | Combining positive reinforcement and response cost. The child earns rewards and privileges contingent on performing desired behaviors and loses the rewards and privileges based on undesirable behavior. | Child earns stars for completing assignments and loses stars for getting out of seat. The child cashes in the sum of stars at the end of the week for a prize. |

Treatment plans for ADHD typically require children, families, and schools to enter into a long-term plan that includes a complex medication schedule along with environmental and behavioral interventions. Environmental and behavioral interventions will require ongoing efforts by parents, teachers, and the child. A common cause of non-response to treatment is lack of adherence to the treatment plan. Ongoing monitoring of a child's progress should assess the implementation of the plan and determine key problems with, and barriers to, implementation. The clinician should assess adherence to medication and behavior therapy. Lack of adherence is not the equivalent of treatment failure; clinicians should help families find solutions to adherence problems before considering a plan as a failure.

Referral Criteria

The following can be considered true treatment failure: 1) lack of response to 2 or 3 stimulant medications at maximum dose without side effects or at any dose with intolerable side effects; 2) inability of behavioral therapy or combination therapy to control the child's behaviors; and 3) the interference of a coexisting condition. In each of these situations, referral to mental health specialists who are knowledgeable about behavioral interventions in children is the next step unless the primary care clinician has expertise and experience in managing these situations.

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