

**TEXAS CHILDREN'S HOSPITAL**  
**EVIDENCE-BASED OUTCOMES CENTER**  
**Attention-Deficit/Hyperactivity Disorder (ADHD): Screening and Diagnosis**  
**Evidence-Based Guideline**

**Definition:** Attention-deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood with temperamental, environmental, and genetic risk factors with a high rate of comorbidity with neurodevelopmental, learning, and psychiatric conditions. <sup>(1)</sup> ADHD is characterized by developmentally inappropriate and disabling levels of inattention, impulsivity, and/or hyperactivity that impair social, educational, or occupational functioning across settings. Symptoms fall into two categories: 1) inattention and 2) hyperactivity and impulsivity.

There are three different types of ADHD, depending on which types of symptoms are strongest in the individual:

- Predominantly Inattentive Presentation: It is hard for the individual to organize or finish a task, to pay attention to details, or to follow instructions or conversations. The person is easily distracted or forgets details of daily routines.
- Predominantly Hyperactive-Impulsive Presentation: The person fidgets and talks a lot. It is hard to sit still for long (e.g., for a meal or while doing homework). Smaller children may run, jump or climb constantly. The individual feels restless and has trouble with impulsivity. Someone who is impulsive may interrupt others a lot, grab things from people, or speak at inappropriate times. It is hard for the person to wait their turn or listen to directions. A person with impulsiveness may have more accidents and injuries than others.
- Combined Presentation: Symptoms of the above two types are equally present in the person.

As the child ages, symptoms of hyperactivity decrease while impairment from inattention and impulsivity might increase. <sup>(2)</sup>

**Epidemiology:** Attention-deficit/hyperactivity disorder (ADHD) occurs in roughly 3–5% of all children and adolescents. <sup>(3)</sup> Children with ADHD often show comorbid psychiatric disorders (anxiety disorders: approximately 30%, oppositional defiant disorder: approximately 50%, conduct disorder: approximately 30%<sup>1</sup>, learning disabilities: approximately 50%, and motor incoordination: approximately 50%, which also strongly influence the clinical outcome of the disorder.

**Etiology:** There is evidence that ADHD is caused by an interaction of genetics, neurobiology, and environmental experiences. Non-genetic causes of ADHD include factors such as prematurity, perinatal stress and low birthweight, traumatic brain injury, maternal smoking during pregnancy, severe early deprivation and maltreatment, and lead toxicity. <sup>(4)</sup>

**Inclusion Criteria**

Patients with suspected or diagnosed ADHD who are 6 to 18 years of age. <sup>(5)</sup>

**Exclusion Criteria**

Patients younger than 4 years of age <sup>(5)</sup>

- Consider referral to specialty care for further evaluation to confirm diagnosis.

**Differential Diagnosis**

The following conditions are often comorbid with ADHD, but can also mimic ADHD: <sup>(2,4)</sup>

- Oppositional defiant disorder
- Conduct disorder
- Anxiety disorder
- Autism spectrum disorder
- Mood disorder (Mania, Bipolar disorder, Depression)
- Posttraumatic stress disorder
- Language or learning disorder
- Intellectual disability
- Substance abuse
- Poor sleep hygiene
- Sleep deprivation

**Diagnostic Evaluation**

**History: Assess for**

- Family history (e.g., ADHD, other neurodevelopmental disorder)
- Birth history/Pregnancy complications
- Medical history (e.g., history of seizures, history of lead poisoning)
- Developmental milestones
- School/learning history
- Social history
- Treatment history
- ADHD symptomatology
  - Symptomatic for >6 months
  - Symptoms inconsistent with developmental level
  - Symptoms are not secondary to developmental delay/intellectual disability, language or learning disorder, psychosocial stressors/inconsistent parenting, or other psychiatric condition (anxiety, depression)
  - Several symptoms evident prior to 12 years of age in at least 2 environments (e.g., home and school)
  - Symptoms severe enough to interfere with function

\* This assessment may be completed over multiple visits.

**Physical Examination**

- Skin findings, birthmarks
- Neurologic exam
- Growth
- Head circumference
- Dysmorphic features
- Development assessment

### Critical Points of Evidence\*

#### TCH Evidence-Based Recommendations

##### **Evidence Supports**

- Recommendation for the use of rating scales or tools that screen and assess the presence and severity of ADHD only or that of commonly comorbid conditions as well (6-21)
- Recommendation for the referral to a specialist when a significant comorbidity or elevated level of complexity exists (22-28)
- Recommendation for the use of certain rating scales or tools to screen for comorbidities (29-33)

##### **Evidence Lacking/Inconclusive**

- Recommendation for the utilization of a rating scale or tool in the ADHD screening and diagnosis process; a rating scale is necessary but insufficient to establish an ADHD diagnosis
- No recommended time during the course of treatment for screening for comorbidities

#### **Recommendations Adopted/Adapted from National Guidelines**

- For preschool-aged children (age 4 years to the sixth birthday) with ADHD, the Primary Care Clinician (PCC) should prescribe evidence-based behavioral Parent Training in Behavior Management (PTBM) and/or behavioral classroom interventions as the first line of treatment, if available (35)

**Remarks:** This recommendation was adopted from the American Academy of Pediatrics Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents 2019.

- Methylphenidate may be considered if these behavioral interventions do not provide significant improvement and there is moderate-to-severe continued disturbance in the 4- through 5-year-old child's functioning. In areas in which evidence-based behavioral treatments are not available, the clinician needs to weigh the risks of starting medication before the age of 6 years against the harm of delaying treatment. (35)

**Remarks:** This recommendation was adopted from the American Academy of Pediatrics Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents 2019.

- For elementary and middle school-aged children (age 6 years to the 12th birthday) with ADHD, the PCC should prescribe US Food and Drug Administration (FDA)-approved medications for ADHD, along with PTBM and/or behavioral classroom intervention (preferably both PTBM and behavioral classroom interventions). Educational interventions and individualized instructional supports, including school environment, class placement, instructional placement, and behavioral supports, are a necessary part of any treatment plan and often include an Individualized Education Program (IEP) or a rehabilitation plan (504 plan). (35)

**Remarks:** This recommendation was adopted from the American Academy of Pediatrics Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents 2019.

\*NOTE: The references cited represent the entire body of evidence reviewed to make each recommendation.

### Practice Recommendations

#### **Screening and Diagnostic Tools**

The rating scales or tools below should be used for *screening and diagnosis* of ADHD. – Strong recommendation, low quality evidence (6-21,34)

<b>Tools</b>	<b>Strengths</b>	<b>Limitations</b>
Conners Rating Scales - Revised	20 min. duration; self, parent, or teacher versions; Six distinct scales; 3-17 years for parent/ teacher version and 12-17 years for self-version	Proprietary (\$273/kit)
Behavior Assessment System for Children (BASC)	10 -30 min. duration for parent and teacher version; 6- 21 years	30 min. duration for self-report version; 100-160 items (vary by version); Proprietary (\$132.20 - 1,655/kit)
Child Behavior Checklist (CBCL)	15-20 min. duration; parent or caregiver/ teacher for 1.5 to 5 years: 99 items; parent/ teacher: 118 items Test-retest: 0.95 to 1.00 Inter-rater reliability: 0.93 to 0.96 Internal consistency: 0.78 to 0.97 Criterion validity was assessed and found to be acceptable.	Responses need to be entered and scored; Electronic scoring available; Proprietary (\$310-435/kit)
PSC-Y/ PSC-35 – self and parent assessment	< 5 min duration; 35 questions; Free; Pictorial version available;4-16 years	High sensitivity (80-95%); Low specificity (68-100%)
Vanderbilt Diagnostic Rating Scales	10 min. duration; 40-55 questions initial evaluation; 26 question follow-up; Free	Initial evaluation and follow-up; Age 6-12 years

#### **Screening Tools Efficacy**

Consider using a tool when screening and diagnosing ADHD. While a thorough clinical evaluation is the gold standard, screening and diagnostic tools can help determine the severity or presence of comorbid conditions. – Consensus recommendation

### Referral to Specialist Care

A primary care physician should consider referring to a specialist based on their clinical judgment and when the presence of a significant comorbidity or an elevated level of complexity is indicated. – Strong recommendation, low quality evidence (22-28)

### Screening for Comorbidities

For all adolescents 11 years and older, screen for depression using a tool recommended by the American Academy of Pediatrics complimented by the Vanderbilt Diagnostic Rating Scale. For patients younger than 11 years, screen with the Vanderbilt Diagnostic Rating Scale and compliment with an age-appropriate depression screening from the list below if the provider has concerns.

Refer to the following tools to screen for depression:

Tools	Strengths	Limitations
PHQ (Patient Health Questionnaire) – 2	1 min duration; Free Overall (for depression): Sensitivity: 83% to 87% Specificity: 78% to 92% PPV: not available	Non-English version not validated; Adult
PHQ (Patient Health Questionnaire) – 9	<5 min duration; Free Excellent internal reliability and test-retest reliability. Cutoff score of 10 or more: Sensitivity: 88% for major depression Specificity: 88% for major depression	Non-English version not validated; Adult
PHQ (Patient Health Questionnaire) -9A	9 item severity scoring system modified for teens	Teen version
GAPS (Guidelines for Adolescent Preventive Services) Questionnaires	72 items for younger adolescent 61 items for older adolescent 15 items for parent	Parent, young teen, or older teen versions
PSC-Y/ PSC-35 – self and parent assessment	< 5 min duration; 35 questions; Free; Pictorial version available; 4-16 years	High sensitivity (80-95%); Low specificity (68-100%)
Children's Depression Inventory	5-10 min; 27 items; internal consistency coefficients range from 0.71 to 0.89 and the test-retest coefficients range from 0.74 to 0.83;	Reading level: first grade; Proprietary (\$250/kit)
Center for Epidemiological Studies – Depression Scale (CES-DS) – modified for children and adolescents	20 items; 6-17 years; 5-10 min duration; Free	Used in adult populations. Modified version for children and adolescents may not discriminate well between depressed and non-depressed adolescents. Sensitivity: 71% Specificity: 57%

Screen for anxiety using the SCARED (Self-Report for Childhood Anxiety Related Emotional Disorders) tool or an alternative based on patient's symptomatology. The efficacy of anxiety screening tools was limited in the primary care provider setting; escalate patients to specialty care provider for further testing as necessary. – Strong recommendation, low quality evidence (29-33)

Patients should be screened for additional comorbidities by their primary care physician. – Consensus recommendation

### Psychoeducational Testing

Patients that present with significant learning difficulties or if learning difficulties persist after treatment for ADHD has been optimized, parents/caregivers should request a psychoeducational evaluation through their child's school district. Parents should ensure their child receives extra instructional support and monitoring of progress through Response to Intervention. – Consensus recommendation

### Condition-Specific Elements of Clinical Management

#### General:

In addition to routine care,

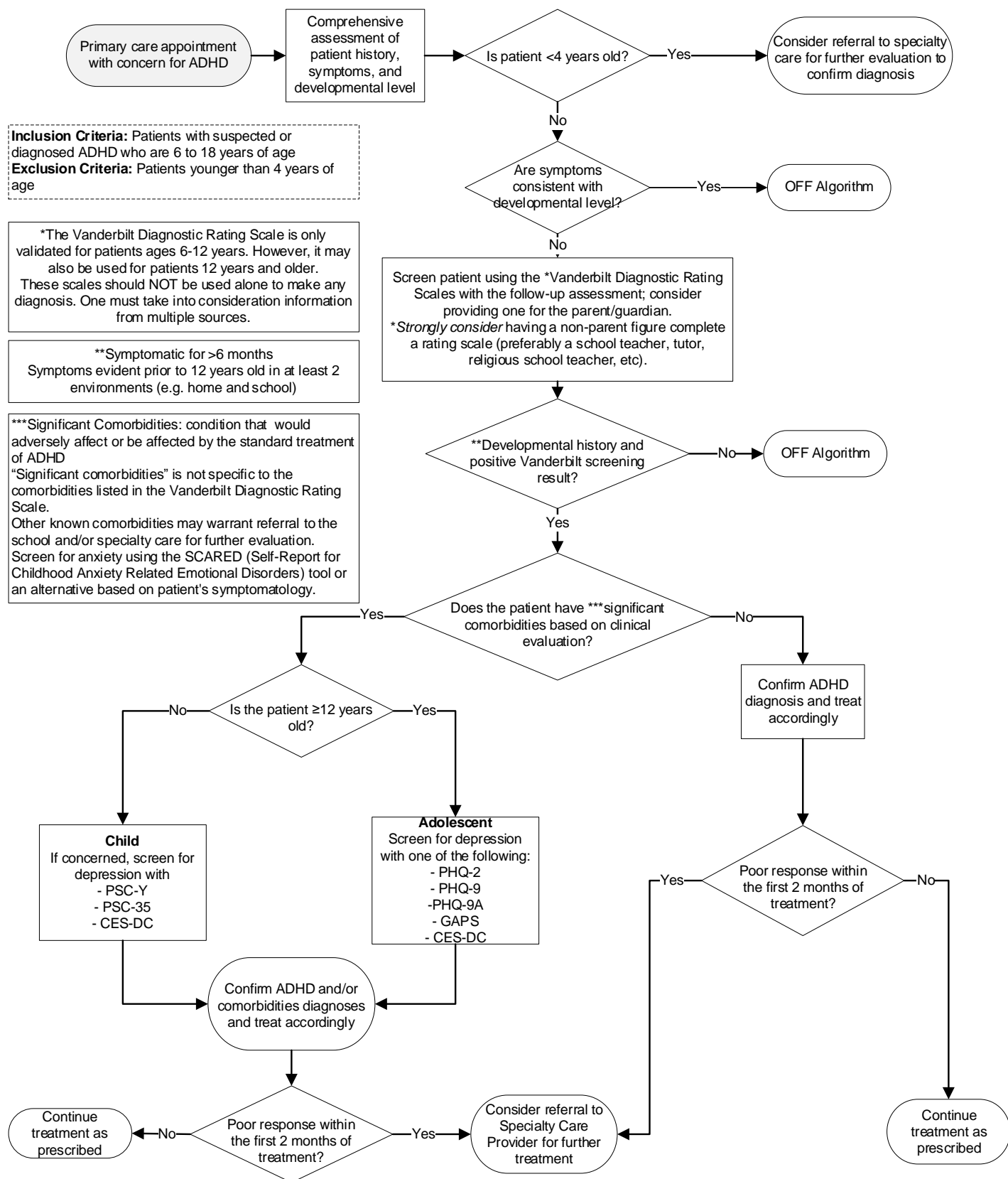
- Use a recommended rating scale or tool during the screening and diagnosis process
- Use a recommended tool to screen for comorbidities
- Refer to a specialty care provider based on clinical judgment or when the presence of a significant comorbidity or an elevated level of complexity is indicated

#### Measures

#### Outcome

- Percentage of patients whose evaluation includes a screening tool
- Increased diagnostic accuracy of ADHD and comorbidities
- Timely referral to specialty care

## TCH Evidence-Based Outcomes Center Clinical Algorithm for the Screening and Diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD)



Clinical standards are developed for 80% of the patient population with a particular disease. Each practitioner must use his/her clinical judgment in the management of any specific patient.

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### Clinical Standards Preparation

This clinical standard was prepared by the Evidence-Based Outcomes Center (EBOC) team in collaboration with content experts at Texas Children's Hospital. Development of this clinical standard supports the TCH Quality and Patient Safety Program initiative to promote clinical standards and outcomes that build a culture of quality and safety within the organization.

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No relevant financial or intellectual conflicts to report.

### Development Process

This clinical standard was developed using the process outlined in the EBOC Manual. The literature appraisal documents the following steps:

1. Review Preparation
  - PICO questions established
  - Evidence search confirmed with content experts
2. Review of Existing External Guidelines
  - American Academy of Pediatrics Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents 2019
3. Literature Review of Relevant Evidence
  - Searched: EBSCO, PubMed, CINAHL
4. Critically Analyze the Evidence
  - 15 non-randomized studies
5. Summarize the Evidence
  - Materials used in the development of the clinical standard, literature appraisal, and any order sets are maintained in a Attention-Deficit/Hyperactivity Disorder (ADHD) evidence-based review manual within EBOC.

### Evaluating the Quality of the Evidence

Published clinical guidelines were evaluated for this review using the **AGREE II** criteria. The summary of these guidelines are included in the literature appraisal. AGREE II criteria evaluate Guideline Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity and Presentation, Applicability, and Editorial Independence using a 4-point Likert scale. The higher the score, the more comprehensive the guideline.

This clinical standard specifically summarizes the evidence *in support of* or *against* specific interventions and identifies where

evidence is *lacking/inconclusive*. The following categories describe how research findings provide support for treatment interventions. **"Evidence Supports"** provides evidence to support an intervention. **"Evidence Against"** provides evidence against an intervention. **"Evidence Lacking/Inconclusive"** indicates there is insufficient evidence to support or refute an intervention and no conclusion can be drawn *from the evidence*.

The **GRADE** criteria were utilized to evaluate the body of evidence used to make practice recommendations. The table below defines how the quality of the evidence is rated and how a strong versus weak recommendation is established. The literature appraisal reflects the critical points of evidence.

Recommendation	
<b>STRONG</b>	Desirable effects clearly outweigh undesirable effects or vice versa
<b>WEAK</b>	Desirable effects closely balanced with undesirable effects
Quality	Type of Evidence
<b>High</b>	Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies
<b>Moderate</b>	Evidence from RCTs with important limitations (e.g., inconsistent results, methodological flaws, indirect evidence, or imprecise results) or unusually strong evidence from unbiased observational studies
<b>Low</b>	Evidence for at least 1 critical outcome from observational studies, RCTs with serious flaws or indirect evidence
<b>Very Low</b>	Evidence for at least 1 critical outcome from unsystematic clinical observations or very indirect evidence

### Recommendations

Practice recommendations were directed by the existing evidence and consensus amongst the content experts. Patient and family preferences were included when possible. The Content Expert Team and EBOC team remain aware of the controversies in the diagnosis/management of Attention-Deficit/Hyperactivity Disorder (ADHD) in children. When evidence is lacking, options in care are provided in the clinical standard and the accompanying order sets (if applicable).

### Approval Process

Clinical standards are reviewed and approved by hospital committees as deemed appropriate for its intended use. Clinical standards are reviewed as necessary within EBOC at Texas Children's Hospital. Content Expert Teams are involved with every review and update.

### Disclaimer

Practice recommendations are based upon the evidence available at the time the clinical standard was developed. Clinical standards (guidelines, summaries, or pathways) do not set out the standard of care and are not intended to be used to dictate a course of care. Each physician/practitioner must use his or her independent judgment in the management of any specific patient and is responsible, in consultation with the patient and/or the patient's family, to make the ultimate judgment regarding care.

### Version History

Date	Action	Comments
Nov 2015	Originally completed	
Oct 2021	Reaffirmed	Reaffirmed by Content Expert Team with no new literature search