ADD-ADHD
A CHALLENGE FOR PRIMARY CARE PEDIATRICIANS
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ADD-ADHD:
A CHALLENGE FOR PRIMARY CARE PEDIATRICIANS

1. Diagnosis
2. Natural History
3. Co-Morbidities
4. A little about medications
5. Main recommendations for Primary and Community Pediatricians
6. Conclusions
7. 5 minutes for general discussion
DSM is the manual used by clinicians and researchers to diagnose and classify mental disorders. The American Psychiatric Association (APA) published DSM-5 months ago, culminating a 14-year revision process. **ADHD was slightly changed !!**
DIAGNOSIS CRITERIA OF ADHD

• A. Either inattention or hyperactive features (at least 6 of each), persisting for more than 6 months. In older people more than 17 years old only 5 of each are necessary in order to meet the criteria.

• B. Some symptoms that caused impairment are present before age 12 years (DSM 5).

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

• D. There must be clear evidence of clinically significant impairment in social, academic, or in-job functioning;

• E. Would co-occur with a PDD disorder (DSM 5).

• F. ADHD symptoms must not occur exclusively during the course of schizophrenia or another psychotic disorder and must not be better explained by another mental disorder, such as a depressive or bipolar disorder, anxiety disorder, dissociative disorder, personality disorder, or substance intoxication or withdrawal. (DSM 5)
Attention-Deficit/Hyperactivity Disorder

The diagnostic criteria for attention-deficit/hyperactivity disorder (ADHD) in DSM-5 are similar to those in DSM-IV. The same 18 symptoms are used as in DSM-IV, and continue to be divided into two symptom domains (inattention and hyperactivity/impulsivity), of which at least six symptoms in one domain are required for diagnosis. However, several changes have been made in DSM-5:

1) examples have been added to the criterion items to facilitate application across the life span;
2) the cross-situational requirement has been strengthened to “several” symptoms in each setting;
3) the onset criterion has been changed from “symptoms that caused impairment were present before age 7 years” to “several inattentive or hyperactive-impulsive symptoms were present prior to age 12”;
4) subtypes have been replaced with presentation specifiers that map directly to the prior subtypes; 
5) a comorbid diagnosis with autism spectrum disorder is now allowed; and 
6) a symptom threshold change has been made for adults, to reflect their substantial evidence of clinically significant ADHD impairment, with the cutoff for ADHD of five symptoms, instead of six required for younger persons, both for inattention and for hyperactivity and impulsivity.

Finally, ADHD was placed in the neurodevelopmental disorders chapter to reflect brain developmental correlates with ADHD and the DSM-5 decision to eliminate the DSM-IV chapter that includes all diagnoses usually first made in infancy, childhood, or adolescence.
Diagnostic criteria for Attention-Deficit/Hyperactivity Disorder

(1) **Inattention**

- often fails to give close attention to details or makes careless mistakes in activities
- often has difficulty sustaining attention
- often does not seem to listen when spoken to directly
- often does not follow through on instructions and fails to finish work
- often has difficulty organizing tasks and activities
- often losses things
- often avoids tasks
- often easily distracted to stimuli
- often forgetful
(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
- 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 awaiting turn**
- often **interrupts or intrudes on others** e.g., butts into conversations or games
ADHD: Overview

- Estimated prevalence: 6%-8% of children; 6% of adolescents; 4% of adults

- **DSM-IV-TR®** ADHD types
  - Combined (50%-75%)
  - Predominantly inattentive (20%-30%), increasing with age
  - Predominantly hyperactive-impulsive (<15%)

- 2.5:1 male to female ratio in children and adolescents

*DSM-IV-TR; Diagnosis and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision.*

American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, 4th ed, text revision.*


Course of ADHD

- Hyperactivity
- Impulsivity
- Inattention

Time

Symptoms in early childhood

Preschool age

Delay in language development
Delay in motor development
Rapid changes of mood, inattention and/or hyperactivity, impulsivity, poor ability to attend specific tasks, lack of fear

Sleep disorders

At Preschool age: Inattentive 15%; hyperactive-impulsive 50%; combined 35-40%

At school age: inattentive 50% and hyperactive-impulsive 20%

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**Neurotransmitter function:** ADHD is thought to be caused by an imbalance of 2 neurotransmitters, dopamine (DA) and norepinephrine (NE), which are believed to play an important role in the ability to focus and pay attention to tasks.

**Genetics:** Research strongly suggests that ADHD tends to run in families.

**Environment:** Certain external factors such as smoking or poor maternal health during pregnancy may contribute to ADHD.

**Brain Injuries:** May contribute to develop ADHD.
Neural Networks of Attention

- Prefrontal cortex
- Parietal cortex
- Cingulate gyrus
- Limbic structures (amygdala-hippocampus)
- Basal ganglia
- Thalamus
- Brainstem (reticular formation)
- Cerebellum

ADHD Imaging Studies Summary

- Neuroimaging studies confirm that brain abnormalities in frontosubcortical networks are associated with ADHD.
- But neuroimaging techniques are not valid tools for ADHD diagnosis; imaging measures are not sensitive or specific enough to be used for diagnostic purposes.

Frontosubcortical Networks and Catecholamines

- Dysregulation of inhibitory influences of frontocortical activity (predominantly noradrenergic) on lower striatal structures (predominantly dopaminergic)
- Striatal structures driven by dopaminergic agonists controlled or modulated by higher inhibitory structures sensitive to adrenergic agents

Developmental Trajectories of Brain Volume Abnormalities in Children and Adolescents With ADHD

Main Findings:

- Smaller brain volumes in all regions independently of medication status
- Smaller total cerebral (−3.2%) and cerebellar (−3.5%) volumes
- Volumetric abnormalities (except caudate) persisted with age
- No gender differences
- Volumetric findings correlated with severity of ADHD

A pathophysiologic approach to growth problems in children with attention-deficit/hyperactivity disorder. Authors Tenore A, Tenore A.
Endocrinol Metab Clin North Am. 2012 Dec;41(4):761-84
A pathophysiologic approach to growth problems in children with attention-deficit/hyperactivity disorder.

Authors: Tenore A, Tenore A.

Heritability of ADHD

Mean heritability of ADHD = 0.75

ALONE OR TOGETHER
Comorbidity in children

- ADHD: 31%
- ODD: 40%
- TICS: 11%
- ANXIETY: 34%
- CD: 14%
• **CO-MORBIDITIES**

• ADHD frequently is comorbid with other psychiatric disorders (Pliszka et al., 1999). 54–84% of children and adolescents with ADHD may meet criteria for oppositional defiant disorder (ODD); a significant portion of these patients will develop conduct disorder (Barkley, 2005; Faraone et al.,)

• 25% to 35% of patients with ADHD will have a coexisting learning or language problem (Pliszka et al., 1999), and anxiety disorders occur in up to one-third of patients with ADHD (Biederman et al., 1991; MTA Cooperative Group, 1999b; Pliszka et al., 1999; Tannock).

The prevalence of mood disorder in patients with ADHD is more controversial, with studies showing up to 33% of patients with ADHD meeting criteria for a depressive disorder (Pliszka et al., 1999). The prevalence of mania among patients with ADHD remains a contentious issue (Biederman, 1998; Klein et al.).

• Biederman and colleagues (Biederman et al., 1992) found that 16% of a sample of ADHD patients met criteria for mania, although a chronic, irritable mania predominated.

• Comorbidity in adult ADHD patients is similar to that of children, except that antisocial personality replaces ODD or CD as the main behavioral psychopathology and mood disorders increase in prevalence (Biederman, 2004). Clinicians should be prepared to encounter a wide range of psychiatric symptoms in the course of managing patients with ADHD.
Diagnosis approach: **Neurocognitive and behavioral disorder**

- In order to assess:
  - Executive and cognitive functions.
  - To measure Inhibition, intelligence, memory
    - Ej: CPT Continuous Performance Task/Test – Conners
  - Test of Variables of Attention or **TOVA**

**Intake-anamnesis**

**Clinical diagnosis**

**Questionnaires**

**Neuro-cognitive tests**
CONNERS TEST

ADHD inattentive
  hiperqactive - compulsive
  combined

Hyperactivity/Impulsivity
Learning Problems

General Psychopathology
Inattention

  Executive Functioning
Aggression

Peer Relations
Family Relations

  Oppositional Defiant Disorder
Conduct Disorder
What are the potential consequences of ADHD?

**ADHD**

Adults with ADHD may be:
- **3x** to be currently unemployed
- **2x** to have problems keeping friends
- **47%** more likely to have trouble paying bills
- **2x** more likely to have been arrested
- **2x** more likely to have been divorced
- **2x** likely to rarely or never use birth
- **4x** likely to have contracted a sexually transmitted disease
- **78%** more likely to be addicted to tobacco
- **2x** more likely to have been involved in 3 or more car crashes

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Lifetime Course of ADHD Symptoms: Inattention Domain

**Childhood**
- Difficulty sustaining attention
- Doesn’t listen
- No follow-through
- Can’t organize
- Loses important items

**Adulthood**
- Difficulty sustaining attention (meetings, readings, paperwork)
- Paralyzing procrastination
- Slow, inefficient
- Poor time management
- Disorganized

## Lifetime Course of ADHD Symptoms: Hyperactivity-Impulsivity Domain

<table>
<thead>
<tr>
<th>Childhood</th>
<th>Adulthood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squirming, fidgeting</td>
<td>Inefficiencies at work</td>
</tr>
<tr>
<td>Can’t stay seated</td>
<td>Can’t sit through meetings</td>
</tr>
<tr>
<td>Can’t wait turn</td>
<td>Can’t wait in line</td>
</tr>
<tr>
<td>Runs/climbs excessively</td>
<td>Drives too fast</td>
</tr>
<tr>
<td>Can’t play/work quietly</td>
<td>Self-selects very active job</td>
</tr>
<tr>
<td>On the go/driven by motor</td>
<td>Can’t tolerate frustration</td>
</tr>
<tr>
<td>Talks excessively</td>
<td>Talks excessively</td>
</tr>
<tr>
<td>Blurs out answers</td>
<td>Interrupts others</td>
</tr>
<tr>
<td>Intrudes/interrupts others</td>
<td>Makes inappropriate comments</td>
</tr>
</tbody>
</table>

Substance Use Disorders in ADHD Teens Growing Up: Overall Rate of Substance Use Disorder

Individuals With Substance Use Disorder (%)

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-ADHD (n=137)</td>
<td>18</td>
<td>13.2</td>
</tr>
<tr>
<td>Medicated ADHD (n=56)</td>
<td>25</td>
<td>45.5</td>
</tr>
<tr>
<td>Unmedicated ADHD (n=19)</td>
<td>75</td>
<td>75.0</td>
</tr>
</tbody>
</table>

*P < .001*

Reference:

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• ADHD IS NOT A SCHOOL PROBLEM... IS A LIFE PROBLEM

Evaluation of the preschooler, child, or adolescent for ADHD should consist of clinical interviews with the parent and patient, obtaining information about the patient’s school or day-care functioning, evaluation for co-psychiatric disorders, and review of the patient’s medical, social, and family history.
2. If the patient’s medical history is unremarkable, laboratory or neurological test are not indicated.

3. Psychological and neuropsychological tests are not mandatory for the diagnosis for ADHD, but should be performed if the patient’s history suggests low general cognitive ability or low achievement in language or mathematics relative to the patient’s intellectual ability.
The clinician must evaluate the patient with ADHD for the presence of co-morbid psychiatric disorders.

- The clinician must integrate the data obtained with regard to co-morbid symptoms to determine:
  
  a) whether the patient meets criteria for a separate co-morbid disorder in addition to ADHD,
  
  b) whether the co-morbid disorder is the primary disorder and the patient’s inattention or hyperactivity/impulsivity is directly caused by it
  
  c) whether the co-morbid symptoms do not meet criteria for a separate disorder but represent secondary symptoms stemming from the ADHD.
A well thought-out and comprehensive treatment plan should be developed for the patient with ADHD.

The patient’s treatment plan should take account of ADHD as a chronic disorder and may consist of psychopharmacological and behavior therapy.

Should include parental and child psycho-education about ADHD and its various treatment options (medication and behavior therapy), linkage with community supports, and additional school resources as appropriate.

The treatment plan should be reviewed regularly and modified if the patient’s symptoms do not respond.
Use, bad use and abuse of medications in ADHD
STIMULANT ACTIONS

Better capability to sustain attention
Less aggressiveness
Better social interaction
Compliance

Improve Inhibition and impulsiveness
Social capabilities
Academic accuracy
Academic efficiency

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DEXMETHYLPHENIDATE, RACEMIC- METHYLPHENIDATE, AMPHETAMINE - BASED PRODUCTS

Well known inhibitors of cathecolamine reuptake. Increases trans-synaptic concentrations of the neurotransmitters dopamine and noradrenaline by inhibiting the action of the respective neurotransmitter transporter proteins (DAT-NET) responsible for moving these transmitters back into the presynaptic neuron.

Presynaptic Neurone

Amphetamine blocks reuptake

Cytoplasmic DA

Storage Vesicle

Methylphenidate blocks reuptake

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ADHD: MTA Results

- All treatment arms found to be effective on an absolute basis

Medication management alone

Medication management plus behavioral treatment

Nearly equally effective and superior to both:

- Behavioral treatment alone
- Community-based treatment

MTA, Multimodal Treatment Study of Children With ADHD.

During a psychopharmacological intervention for ADHD, the patient should be monitored for treatment-emergent side effects.

If a patient with ADHD has a robust response to psychopharmacological treatment and subsequently shows normative functioning in academic, family, and social functioning, then psychopharmacological treatment of the ADHD alone is satisfactory.

If a patient with ADHD has a less than optimal response to medication, has a comorbid disorder, or experiences stressors in family life, then psychosocial treatment in conjunction with medication treatment is often beneficial.
Patients should be assessed periodically to determine if there is continued need for treatment or if symptoms have remitted. Treatment of ADHD should continue as long as symptoms remain present and cause impairment.

Patients treated with medication for ADHD should have their height and weight monitored throughout treatment.
**ATOMOXETINE**: FDA + for adult ADHD: affects the regulation of norepinephrine by acting as a potent inhibitor of the pre-synaptic norepinephrine transporter. Is not a controlled medication

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**Why Nonstimulant Treatments for ADHD?**

Problems with the stimulants

- Schedule II drugs (abuse liability, diversion, medicolegal concerns)
- 30% do not adequately respond or cannot tolerate stimulant treatment
- Short duration of action (compliance, embarrassment)
- Side effect profile adversely impacting sleep, appetite, mood, and anxiety
- Concerns about cardiovascular effects, growth suppression, and tic development

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and.... thank you for your **attention**