Attention Deficit Hyperactivity Disorder: A Guide to Diagnosis, Treatment and Common Misconceptions

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Program Overview:
Attention deficit/hyperactivity disorder (ADHD) is one of the most common childhood disorders and can continue through adolescence and adulthood. Symptoms include difficulty staying focused and paying attention, difficulty controlling behavior, and hyperactivity (over-activity). The American Psychiatric Association states in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) that 3%-5% of school-aged children have ADHD. This knowledge-based program will enhance the understanding of ADHD (its causes, symptoms, treatment, and medications). The program will include an in-depth comparison of the available medications to include dosages, metabolism, side-effect profile and reasons practitioners select specific medications for individual patients.

Objectives:
1. Describe the diagnostic criteria and causal theories of ADHD
2. Outline common presentations of the disorder during different periods of development through the use of case studies
3. Compare the current evidence-based treatments available for the disorder, both pharmacologic and non-pharmacologic treatments.
4. Identify current misconceptions about the disorder and the impact of these misconceptions on patients and families

Learning Objectives
1. Review the diagnostic criteria and causal theories of ADHD.
2. Review common presentations of the disorder during different periods of development through the use of case studies.
3. Compare the current evidence-based treatments available for the disorder, both pharmacologic and non-pharmacologic.
4. An in-depth comparison of the available medications will be presented and will include dosages, metabolism, side-effect profile and reasons practitioners select specific medications for individual patients.
5. Current misconceptions about the disorder and the impact of these misconceptions on individuals and families will be discussed.
Top 10 Myths about ADHD

1. ADHD is not a real disorder.
2. ADHD is an American disorder.
3. ADHD is over-diagnosed.
4. Kids with ADHD are over-medicated.
5. Kids with ADHD will outgrow it.
6. ADHD is due to poor parenting.
7. ADHD kids are just lazy and ill-behaved.
8. ADHD kids that take stimulants will abuse drugs.
9. If kids can play video games, watch TV or concentrate on some things, they can’t have ADHD
10. ADHD medications make kids zombies.

ADHD: A Historical Perspective

Sir Alexander Crichton, published in The Lancet, 1902:

“I would point out that a notable feature in many of these cases of moral defect without general impairment of intellect is a quite abnormal incapacity for sustained attention. He concluded: “there is a defect of moral consciousness which cannot be accounted for by any fault of environment”

Two Cases

Robert, 16 yo: combined type
- Diagnosed at age 7
- Multiple med trials over the years
- Moderate response
- Needs high doses-hates meds
- Hates school
- Bored easily, restless
- Excels at sports
- High parent conflict
- Wants to drive
- Wants to go to college doesn’t think he can

Amy, 8 yo: inattentive type
- Quiet, shy
- Not hyperactive
- Bright but average grades
- LD in Mathematics
- Parents concerned-teachers less so
- Can be sluggish
- Low dose stimulants made big difference
- Only uses meds during school

More Current Terms
- Minimal Brain Dysfunction
- Hyperkinetic Disorder of Childhood
- Attention Deficit Disorder
- Attention Deficit Hyperactivity Disorder
Cost of ADHD

- $32 to $52 billion annually in U.S. (CDC, ADHD homepage)
- Diagnosis rates have increased 3%/year from 1997-2006
- 56% of those with diagnosis receive medication

Epidemiology of ADHD

- ~20% of children and adolescents have a mental health diagnosis
- ADHD is by far, the most common (3 to 8%)
- 75% are treated by the PCP
- Half of all pediatric office visits are for behavioral, psychosocial, or academic concerns.

Epidemiology of ADHD

- Across all cultures when same diagnostic criteria applied
- M:F is 3:4:1
- Monozygotic twins: 81% concordance rate
- Parent with ADHD: 50% will have a child with ADHD
- Females: more likely to have inattentive type, less likely to get dx and tx

Why so prevalent?

- Evolutionary advantage in early environments
- One theory—not all inclusive
- Can possibly explain high prevalence rate
- Hyperactivity: helps with foraging, spotting food, predators, danger, moving to better climates
- Impulsivity: helps with reflexive or automatic responses
- Pounce or be pounced on
- Overly focused/contemplative individuals would be at a disadvantage
- Rapidly shifting attention: helps with vigilance, scanning
Once an asset, Now a deficit

- Environment changed rapidly
- Genes haven’t caught up (?)

Modern day environment

- School/workplace demands
- Attentional focus
- Motor passivity
- Many distractions-ADHD brain is wired to pay attention to distractions
- Passive listening
- Delayed response

School and the ADHD child

Why is this important?

- Steering child toward more adaptive environments/pursuits
- Changing environments to fit the child
- Strengths vs weaknesses assessment
- Providing treatment early on when brain is pliable
Theories of Causation

- Multifactorial
- Genetics
- Neurotransmitter deficits: dopamine, norepinephrine
- Perinatal complications
- Toxins: drugs, smoking, alcohol in pregnancy, lead exposure
- Trauma, neurological disorders
- Early severe deprivation

Technology and ADHD

- "You prime the mind to accept a fast pace. Real life doesn’t happen fast enough to keep your attention.”
  ~ Dimitri Christakis, MD, PhD, Univ of Washington

- AAP: Limit tech/screen time, no TV <2 yrs old

DSM-IV ADHD Diagnostic Criteria

Either (1) inattention (6 or more for >6 months)

- Inattention to detail/careless mistakes
- Difficulty with sustained attention to tasks or play
- Doesn’t listen
- Doesn’t follow through with tasks
- Disorganized
- Avoids tasks requiring sustained effort
- Loses things necessary for tasks
- Easily distracted by extraneous stimuli
- Forgetful in daily activities

Or (2) hyperactivity-impulsivity (6 or more for >6 months)

- Fidgets, squirms
- Leaves seat inappropriately in classroom
- Runs around or climbs excessively
- Doesn’t play quietly when expected
- "on the go” as if "driven by a motor”
- Talks excessively
- Blurts out answers inappropriately
- Difficulty with awaiting turn
- Interrupts or intrudes on others

Core symptoms

- Present in multiple settings
- Prior to age 7
- Symptoms must cause significant impairment must be present in social, academic and/or occupational functioning
- Symptoms must be present for 6 months

- Symptoms not better explained by PDD, psychotic d/o, and are not secondary to mood/anxiety disorders, dissociative disorder or personality disorder
Diagnosis

- No single test, no imaging study to confirm diagnosis
- Clinical diagnosis
- Synthesis of info from multiple sources: parents, teachers, caregivers
- Structured interviews-in depth
- Rating scales: Conners, ADHD Rating Scale IV, CBCL: become familiar with one brief, standardized checklist.
- Observation and interview of child
- Psychoeducational testing is helpful

Remember:
The acorn doesn’t fall far from the tree.
You might need to treat the parent(s) too!

Comorbid conditions

- ODD and Conduct Disorder-most common
- Learning Disorders
- Substance Abuse
- Anxiety
- Depression
- Bipolar Disorder

Mania is not just severe ADHD, it includes:
- Mood lability: elation/irritability
- Grandiosity/flight of ideas
- “affective storms”
- Decreased need for sleep
- Age-inappropriate sexual interest

Treatment Approaches

- THERAPEUTIC ALLIANCE!!!!
- Behavior therapy
- Parent and teacher training
- Psychoeducation
- Educational accommodations
- Treat comorbid conditions
- Psychotherapy
- Pharmacotherapy: effective in 85%
Diet, Exercise and ADHD

- Dietary modifications generally not supported (except in food allergic individuals)-current area of research
- Diet: always emphasize good diet/sleep habits
- Exercise: growing evidence that it releases dopamine, NE!

An ADHD Med Without Side Effects:
"Think of exercise as medication: "For a very small handful of people with attention deficit/hyperactivity disorder (ADHD ADD), it may actually be a replacement for stimulants, but, for most, it's complementary — something they should absolutely do, along with taking meds, to help increase attention and improve mood."

says John Ratey, M.D., an associate clinical professor of psychiatry at Harvard Medical School

Success can happen!!

- Treat ‘em when they need it!
- Some persons need the medication just in school
- Some need it 24/7
- Remember, there’s social learning, too!

MTA study

- 1999
- Compared 4 groups
  - Medication only
  - Behavior Tx only
  - Combo Tx
  - Community Tx
- Initial results
  - Medication and Combo were significantly improved
  - Lead field to feel meds were defining factor

MTA study

- JAACAP, May 2009-2008 year follow up
- Differences between treatment groups were not sustained at follow up
- Growth retardation was documented
- Protective effect on later substance abuse not evident
- Very heated debate currently
MTA study

• Treat the individual
• Assess carefully for comorbid conditions
• Periodically assess efficacy of medications
• Not everyone needs long term medications
• Monitor physical parameters and alter dose or medication if necessary

“More research is needed to test whether successful control of symptoms in the short term translates into better prognosis in the long term.”

Benedetto Vitiello, M.D., Chief, Child and Adolescent Treatment and Prevention Intervention Research Branch, NIMH

Risks of Treating ADHD

• All medications have side effects.
• Stimulants have decades of research behind them.

Risks of Not Treating ADHD

• Increase risk of accidents
• Poor school performance/drop out
• Marital strife/divorce
• Work issues: decreased productivity, job loss
• Legal problems
• Poor relationships
• Poor self-concept, depression

Medication Success

• Inquire about patient’s/family’s feelings about using medication
• Educate about disorder and treatment options
• Opportunity to ask questions
• Prepare them for potential side effects
• Validate fears/concerns
Core Principles in Pediatric Psychopharmacology I: Pharmacokinetics

Do not extrapolate dosages from adult dosages:
Children have:

- greater liver/kidney parenchyma per weight.
- greater water and less fat and albumin content.
- larger volume of distribution,
- greater first-pass metabolism,
- a shorter half-life (T ½) more likely
- more rapid elimination of medications.
- Less end-organ availability per unit dose!

Core Principles in Pediatric Psychopharmacology II: Pharmacodynamics

- Receptor density peaks in the preschool years, then gradually declines.
- Stimulants are more likely to cause euphoria in adults than in children.
- Pharmacogenomics: someday we might be able to choose medications based on the patient’s allelic array of transporter, receptor and enzyme genes.

Using Stimulants

- No need to start with immediate-release stimulant unless very small child
- See weekly during initial titration, and adjust dose weekly
- Baseline BP, pulse rate, height and weight, then follow
- No EKG unless personal or family history of cardiac disease, especially dysrhythmia
- Options for the child who can’t swallow a pill
  - Sprinkles: onto applesauce, pudding, Go-gurts.
  - Patch: onto the hip
Stimulants

- Methylphenidate
- Amphetamine
- Lisdexamphetamine
- Equally effective
- 65-75% response rate
- Decades of research

Methylphenidates

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<th>FDA Max/day</th>
<th>Starting Dose</th>
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**Short acting: BID or TID**

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<tr>
<th></th>
<th>FDA Max/day</th>
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<tbody>
<tr>
<td>Focalin</td>
<td>20mg</td>
<td>5mg</td>
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<tr>
<td>Methylin</td>
<td>60mg</td>
<td>5mg</td>
</tr>
<tr>
<td>Ritalin</td>
<td>60mg</td>
<td>5mg</td>
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**Intermediate acting: QD or BID**

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<tr>
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<tr>
<td>Metadate ER</td>
<td>60mg</td>
<td>10mg</td>
</tr>
<tr>
<td>Metadate SR</td>
<td>60mg</td>
<td>10mg</td>
</tr>
<tr>
<td>Ritalin SR</td>
<td>60mg</td>
<td>20mg</td>
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Amphetamines

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**Short acting: BID or TID**

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<tr>
<th></th>
<th>FDA Max/day</th>
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<tbody>
<tr>
<td>Dexedrine</td>
<td>40mg</td>
<td>Start 5mg/dose</td>
</tr>
<tr>
<td>Dextrostat</td>
<td></td>
<td>Half for pre-</td>
</tr>
<tr>
<td>Adderall</td>
<td></td>
<td>schoolers</td>
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**Long acting: QD**

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<tr>
<td>Dexedrine Spansules</td>
<td>40mg</td>
<td>5-10mg</td>
</tr>
<tr>
<td>Adderall XR</td>
<td>30mg</td>
<td>20-30mg</td>
</tr>
<tr>
<td>Lisdexamphetamine</td>
<td>70mg</td>
<td>20-30mg</td>
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Stimulant side effects

- Ask specific, rather than general, questions regarding side effects.
- Weight loss, decreased appetite
- Insomnia
- Headache
- Tics
- Emotional irritability
- Less common: psychosis, severe aggression
- Growth retardation (debated)

- Methylphenidate may cause relatively greater side effects in preschoolers.
- Stimulants may cause increased irritability in children with autism spectrum disorders.

What About Growth Suppression?

- Best evidence is that many children using stimulants will experience a slight tailing off in growth rate, around a centimeter or so in height and a kilogram or two in weight over 2 years.

- Long-term significance of this is unclear, as there is some evidence that final adult height is not affected.

- Encourage high-nutrient diets in patients with ADHD.

Stimulant use Precautions

- Glaucoma
- Hyperthyroidism
- Hypertension
- Don’t use with MAO-I
- Drug and alcohol abuse
  - No evidence stimulant use causes increased risk of substance abuse in teens
- Known cardiac defects

Dosing: How high is too high?

- “The AACAP has also issued specific parameters for the use of stimulant medications (American Academy of Child and Adolescent Psychiatry, 2002). These doses represent guidelines; with careful clinical monitoring, these doses may be exceeded in individual cases.”

- “There is a linear relationship between dose and clinical response.”

- “There is no evidence of a global therapeutic window in ADHD patients. Each patient, however, has a unique dose-response curve.”

AACAP Practice Parameters for ADHD, 2007
Dosing: How high is too high?

- Titrate stimulants until you get a positive response or untoward side effect
- In select cases, we go above FDA-recommended max doses
- These case require close monitoring

Non-stimulants: Atomoxetine

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<tr>
<th>Long acting: QD or BID</th>
<th>FDA Max/day</th>
<th>Starting Dose</th>
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<tbody>
<tr>
<td>Atomoxetine (Strattera)</td>
<td>100mg or 1.8mg/kg</td>
<td>0.5-1.2 mg/kg/day</td>
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Special Considerations with Atomoxetine

- Adolescents who drive cars-24 hour coverage
- When switching from stimulant to atomoxetine, overlap stimulant use for first week of atomoxetine administration.
- Increase dose weekly until effective or side effects
- Use if anxiety or D&A issues are present
- Use if can’t tolerate stimulant

2nd line medications

- Bupropion-use with comorbid depression
- Tricyclic antidepressants: blood levels, ECGs
- Alpha agonists: help with tics, hyperactivity and impulsivity most
- Use care in combining these with stimulants
Side Effects of Alpha Agonists
Clonidine and Guanfacine

- Headache
- Nausea
- Dizziness
- Decreased heart rate
- Decreased blood pressure
- Sedation/somnolence
- Fainting
- Must taper

Extended Release Alpha Agonists

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<tr>
<th>Drug</th>
<th>FDA Max/day</th>
<th>Starting Dose</th>
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<tbody>
<tr>
<td>Intuniv (guanfacine)</td>
<td>4mg/day</td>
<td>0.12mg/kg/day</td>
</tr>
<tr>
<td>Kapvay (clonidine)</td>
<td>0.4mg/day</td>
<td>0.05mg/kg/day</td>
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How Long to Treat?

Patients should be assessed periodically to determine whether 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.

- Drug-free trials of 1-2 weeks with monitoring and feedback from home and school
- I don’t begin or stop ADHD medication
  - Within 4 weeks in either direction of the holidays
  - Within 4 weeks of the end of the school year

Educational Considerations

- Identify needs
- Individualized approach
- Strengths-based
- Match child to environment and teacher
- Identify learning disorders
- Classroom behavioral plans
- Team approach: support each other
- Involve the child
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References
- JAACAP, Practice Parameter for the Assessment and Treatment of Children and Adolescents with ADHD, 46(7), July 2007, 894-917
- Int J of Clinical Practice, Clinical Assessment and Treatment of ADHD in Children, 2007; 61(S1):1730-1738
- Ratey, J. Exercise: A Med Without Side Effects

Resources
- CHADD: www.chadd.org
- American Academy of Child and Adolescent Psychiatry: www.aacap.org
- National Institute of Mental Health: www.nimh.nih.gov
- American Academy of Pediatrics: www.aap.org

Notes