Evaluation and Management of ADHD in Preschool and Elementary Children

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Chief Medical Officer
Focus-MD
No disclosures relevant to the content of this talk.

I will not address off label use of any product during this talk.
Preschoolers? Aren’t they too young?
1. The primary care clinician should initiate an evaluation for ADHD for any child 4 through 18 years of age who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity.
Practice Parameter for the Evaluation and Treatment of Children and Adolescents with ADHD
Screening

AACAP- “Screening for ADHD should be part of every Mental Health Assessment regardless of the Chief Complaint.”
SHOULD EVERY CHILD BE SCREENED FOR ADHD?

We screen for: ASD, developmental delays, hearing, vision, PKU, Scoliosis

Help me remember. Maybe I’m confused. Is there another neurodevelopmental disorder for which we don’t recommend early intervention?
How do we decide what to screen for?

Common Conditions  ADHD 5-10% of the population

Conditions That Cause Morbidity  ADHD associated with increased risk: of school failure/underperformance, suicide, depression, anxiety, early death, addiction, accidents, traumatic ER visits, criminality, problems with job performance, underemployment, divorce

Conditions for which there are treatments that improve outcomes  Stimulant medication has been demonstrated to decrease the risk of all of these sometimes completely eliminating the risk, as in the case of children treated before the age of nine and SUD risk.
OK...I’ll get off my soap box.
DIAGNOSIS
DSM 5 Criteria For ADHD

A. Symptoms 6/9- Inattentive and/or 6/9 Hyperactive/Impulsive Symptoms for longer than 6 months & more common than developmentally expected

B. Symptom onset before age 12

C. Symptoms occur in more than one setting

D. Symptoms interfere with or reduce the quality of social, academic or occupational functioning

E. Symptoms are not better explained by something else
Elements of Diagnostic Work Up

AACAP ADHD Practice Parameter
Structured Interviews

Parent/Child  Parent  Child
Rating Scales

Parent/Teacher
Conners Rating Scales
ADHD-RS IV
Medical and Developmental History

Pregnancy: Exposures, Prematurity

Birth: Trauma/asphyxia

Medical Problems: Snoring, seizures, thyroid issues, genetic syndromes

Head Injuries

Developmental Milestones Speech/Language Gross and Fine Motor

Sleep!
Social History

Environment(s) when child was an infant/toddler

Preschool environment(s)

Home environment(s)

One trusted/unconditional adult?
Family History

- ADHD
- but also
- Intellectual disability
- Neurological Problems/Seizures
- LD
- Thought disorders
- Anxiety Disorders
- ODD/CD
- Jail time??
- OCD
- Depression/Mood disorders
- Addiction/SUD
- ASD
Examination

Mental Status Examination

Neurological Exam: Tics/Tremor, Coordination, Handwriting, Soft Signs

Cardiovascular Exam

Assess Growth and Weight
AACAP Diagnosis Parameters

If the medical history is negative then laboratory/neurological studies are not indicated.

Psychological/Neuropsychological testing is not mandatory for the diagnosis of ADHD but should be performed if intellectual disability or learning disability are expected.
Psychological/Educational Testing

“In the vast majority of cases, these learning disorders will be comorbid with the ADHD, and it is recommended strongly that the patient’s ADHD be optimally treated before such testing. It could then be firmly concluded that any deficits identified are clearly the result of a learning disorder and not due to inattention to the test materials.”

-AACAP

Practice Parameter on ADHD
So how is the diagnosis made?
DSM 5 Criteria
AAP Guideline recommends strict adherence to the criteria and careful evaluation
A. Symptoms 6/9- Inattentive and/or 6/9 Hyperactive/Impulsive Symptoms for longer than 6 months & more common than developmentally expected
<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does not pay attention to details or makes careless mistakes with, for example, homework</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Has difficulty keeping attention to what needs to be done</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Does not seem to listen when spoken to directly</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Does not follow through when given directions and fails to finish activities (not due to refusal or failure to understand)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Has difficulty organizing tasks and activities</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Avoids, dislikes, or does not want to start tasks that require ongoing mental effort</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Loses things necessary for tasks or activities (toys, assignments, pencils, or books)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Is easily distracted by noises or other stimuli</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Is forgetful in daily activities</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. Fidgets with hands or feet or squirms in seat</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. Leaves seat when remaining seated is expected</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. Runs about or climbs too much when remaining seated is expected</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. Has difficulty playing or beginning quiet play activities</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. Is “on the go” or often acts as if “driven by a motor”</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. Talks too much</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. Blurts out answers before questions have been completed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17. Has difficulty waiting his or her turn</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. Interrupts or intrudes in on others’ conversations and/or activities</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>19. Argues with adults</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20. Loses temper</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Not all of the school age items apply to preschoolers

Loses things
Delays tasks that require sustained mental effort
We need a preschool specific rating scale
DSM 5 Criteria For ADHD

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E. Symptoms are not better explained by something else
I’m 4 years old

For example
<table>
<thead>
<tr>
<th>Medical</th>
<th>Psychiatric</th>
<th>Educational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep disorders</td>
<td>Anxiety, Intellectual Disability</td>
<td></td>
</tr>
<tr>
<td>Seizures</td>
<td>Depression</td>
<td></td>
</tr>
<tr>
<td>LD/Dyslexia</td>
<td>ODD/CD, IED</td>
<td></td>
</tr>
<tr>
<td>Tourette’s/Tics</td>
<td>ODD/CD, IED</td>
<td></td>
</tr>
<tr>
<td>Processing</td>
<td>OCD</td>
<td></td>
</tr>
<tr>
<td>Thyroid Disorders</td>
<td>OCD</td>
<td></td>
</tr>
<tr>
<td>Speech/Language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TBI</td>
<td>Working Memory, Medication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASD</td>
<td></td>
</tr>
<tr>
<td>Vision/Hearing issues</td>
<td>Thought disorders/psychosis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EF problems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SUD</td>
<td></td>
</tr>
</tbody>
</table>
FDA Cleared Objective Biomarkers for ADHD

QbTest CPT with Motion

NEBA QEEG theta/beta ratio
Neuro-imaging

3000 studies
Not recommended clinically at this time but may be the future
AAP Guideline
Patients should be evaluated for co-morbid conditions
The CHICKEN or the EGG (or BOTH)
Co-Morbidity is the rule not the exception...

....including preschoolers...
Number of Comorbidities in US Children with ADHD

- ADHD alone: 33%
- At least one: 33%
- Three or more: 18%
- Two: 16%

N = 5028

Medical Conditions

Autism spectrum disorder
Sleep disorders
Oppositional Defiant disorder/Conduct disorder
Anger
Hypomania
Mania
Depressive disorders
Obsessive-compulsive disorders
Anxiety disorders
Tics/Tourette disorder

ADHD

Inattentive presentation

ADHD

Combined presentation

ADHD

Hyperactive/Impulsive presentation

Social
Non-verbal LD
Special Communication

Language
Expressive
Receptive
Mixed rec-exp
Stuttering
Written expression
Dyspraxia

Academic
Dysgraphia
Dyslexia
Dyscalculia

Processing
Auditory
Verbal
Sensory
Information

Executive Function
Curing
Working memory
time perception
Organization
Prioritization

Non-Medical Conditions
“Sometimes the Best Diagnosis is No Diagnosis.”
Nelson Handal, MD

Immaturity (Birth date last half of the school year)

80th percentile hyperactivity, impulsivity (Linebacker /Cheerleader Syndrome)

Behavior problems not related to a psychological diagnosis (B.A.D.)

Unhealthy Classroom Environment

Chaotic Home Environment

Victim of Bullying

Odd (not ODD)
TREATMENT
Non-Guideline Treatments

Supplements: Omega 3/6 80/20% Fatty Acids-mixed results studies but can’t hurt. Megavitamins can increase disruptive behavior. Fe and Zn

Exercise: Several studies support improved attention with exercise

Good for health in general and mental health in particular

Recess: Demonstrated to improve standardized test scores for all

Sleep: No one pays attention well if they don’t sleep well

Nutrition: Elimination diets have been eliminated. Healthy diet limiting preservatives and dyes? Food sensitivities/allergies < 1%

Neurofeedback: Studies conflicting with expert consensus that it is not effective
AAP Guidelines: ADHD Treatment
AAP Guideline: Key Action Statement 5

5. Recommendations for treatment of children and youth with ADHD vary depending on the child’s age
Preschoolers 4-5 Year Olds

a. For preschool aged children (4-5 years of age) the primary care clinician should prescribe evidence-based parent and/or teacher administered behavior therapy as the first line of treatment (quality of evidence A/strong recommendation)
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. Behavior therapy usually is implemented by TRAINING PARENTS in specific techniques that improve their abilities to modify and shape their child’s behavior and to improve the child’s ability to regulate his her own behavior.
<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Description</th>
<th>Typical Outcome(s)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral parent training (BPT)</td>
<td>Behavior-modification principles provided to parents for implementation in home settings</td>
<td>Improved compliance with parental commands; improved parental understanding of behavioral principles; high levels of parental satisfaction with treatment</td>
<td>.55</td>
</tr>
<tr>
<td>Behavioral classroom management</td>
<td>Behavior-modification principles provided to teachers for implementation in classroom settings</td>
<td>Improved attention to instruction; improved compliance with classroom rules; decreased disruptive behavior; improved work productivity</td>
<td>.61</td>
</tr>
</tbody>
</table>
Preschool ADHD Treatment Study  PATS

Behavioral interventions were more effective in preschoolers than in school aged children and adolescents and didn’t cause side effects.

Medication was effective but not as effective and with more side effects than medication use in school aged children.
It can be difficult to refer kids to behavioral therapy with qualified mental health professionals (so) all (physicians) have in their tool kit is medication.

William Pelham, Jr PhD Chair of Psychology at FIU
Of note, only 37 of 279 enrolled parents thought that the behavior training resulted in significant or satisfactory improvement (Greenhill et al., 2006a).
It's a start.

Behavioral Therapy, while important is unlikely to lead to symptom remission.
AAP Guideline for Medication in Preschoolers

“...may prescribe methylphenidate if the behavior interventions do not provide significant improvement and there is moderate-to severe continuing disturbance in the child’s function.”

In areas where evidence-based behavioral treatments are not available the clinician needs to weigh the risks of starting medication at an early age against the harm of delaying diagnosis and treatment (quality of evidence B /recommendation)
Ritalin (*methylphenidate*) should not be used in children under the age of 6 years old because it has not been studied in this age group.

amphetamines

EVEKEO FDA approved down to age 3
Go Figure.
Preschooler Medication Take Home Points

8/9 Studies found MPH to be effective as in school aged patients

Slightly lower mean dose .7 mg/kg compared to 1 mg/kg

Slower metabolism, start with shorter acting medication

More emotional side effects--irritability, crying especially after med effect wears off

13% discontinued medication due to side effects

Lower and slower titration compared to school aged kids

Although Amphetamines are FDA approved down to age 3, Methylphenidate is the preferred medication.
AAP Guideline: Elementary School-aged Children

b. For elementary school–aged children (6–11 years of age), the primary care clinician should prescribe US Food and Drug Administration–approved medications for ADHD (quality of evidence A/strong recommendation) and/or evidence-based parent and/or teacher-administered behavior therapy as treatment for ADHD, preferably both (quality of evidence B/strong recommendation).
Multimodal Treatment of ADHD
MTA Study 1999
Teacher-Rated Inattention: Community Control Children Separated By Medication Use

Key Differences, Med Mgt vs CC:

- Initial Titration
- Dose
- Dose Frequency
- #Visits/year
- Length of Visits
- Contact w/schools

Abbreviations: Med Mgt, medication management.
CC, community control.

Why does medication work?

Improves the connection and activation of the strial-frontal network resulting in better regulation of the Default Mode Network.
But I don’t want to medicate my kid.

Right. But what about treating your child’s ADHD?
ADHD MEDICATIONS

FDA APPROVED

Methylphenidate
Dextromethylphenidate
Amphetamine
Dextoamphetamine
Atomoxetine
Guanfacine XR
Clonidine XR

NON-FDA APPROVED

Caffeine
Nicotine
Alcohol
Marijuana
Cocaine and other narcotics
Xanax
<table>
<thead>
<tr>
<th>FDA APPROVED ADHD MEDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOOD ONES</strong></td>
</tr>
<tr>
<td>CONCERTA</td>
</tr>
<tr>
<td>ADDERALL XR</td>
</tr>
<tr>
<td>VYVANSE</td>
</tr>
<tr>
<td>DAYTRANA</td>
</tr>
<tr>
<td>FOCALIN XR</td>
</tr>
<tr>
<td>STRATERRA</td>
</tr>
<tr>
<td>METADATE</td>
</tr>
<tr>
<td>RITALIN</td>
</tr>
<tr>
<td><strong>BAD ONES</strong></td>
</tr>
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<tr>
<td>FOCALIN XR</td>
</tr>
<tr>
<td>STRATERRA</td>
</tr>
<tr>
<td>METADATE</td>
</tr>
<tr>
<td>RITALIN</td>
</tr>
</tbody>
</table>
“WE’VE TRIED EVERYTHING.”

TRIED LOW DOSES OF SEVERAL MEDICATIONS

TRIED A LOT OF DOSES OF ONE CLASS OF MEDICATION

THREW MEDICATION AT THE WALL TO SEE IF IT WOULD STICK
Five Ds of ADHD Control

DRUG

DOSE

DELIVERY SYSTEM

DURATION OF ACTION

DAILY
Drug - STIMULANTS OR NON-STIMULANTS

<table>
<thead>
<tr>
<th>NON-STIMULANTS</th>
<th>STIMULANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRATTERA</td>
<td>METHYLPHENIDATE</td>
</tr>
<tr>
<td>INTUNIV</td>
<td>MIXED AMPHETAMINE SALTS</td>
</tr>
<tr>
<td>KAPVAY</td>
<td>DEXTROAMPHETAMINE</td>
</tr>
</tbody>
</table>
The evidence is particularly strong for stimulant medications and sufficient but less strong for atomoxetine, extended-release guanfacine, and extended-release clonidine (in that order) (quality of evidence A/strong recommendation).

The school environment, program, or placement is a part of any treatment plan. (No quality of evidence sited, emphasis mine)
Drug - STIMULANTS

**AMPHETAMINES**
- ADDERALL
- ADDERALL XR
- DEXTROAMPHE TAMINE
- DEXTROAMPHE TAMINE ER
- VYVANSE

**METHYLPHENIDATE**
- RITALIN and RITALIN LA
- METADATE CD and ER
- CONCERTA
- DAYTRANA (tha patch)
- QUILLIVANT XR (liquid)
85% of ADHD patients respond to stimulant medication and they are the treatment of choice.
40%

Only respond to one class of stimulants or the other
MPH or AMP
AAP Guideline 6. Dose titration

6. The primary care clinician should titrate doses of medication for ADHD to achieve maximum benefit with minimum adverse effects (quality of evidence B/strong recommendation).
AAP Guideline

Because stimulants might produce positive but suboptimal effects at a low dose in some children and youth, **titration to maximum doses** that control symptoms without adverse effects is recommended instead of titration strictly on a milligram-per-kilogram basis.
MTA Study: Titrate Dose to Maximize Benefit

Remission rates increased with increasing dose

Average dosing, mg

Comm Care: 22.6, Med: 37.7

Remission rates

Comm Care: 25%, Med: 56%

Delivery System-time release technology

BEADED TECHNOLOGY

OROS Technology
Therapeutic Window

- Zombie Zone
- YOU ZONE
- ADHD Zone
Possible **Short Term** Side effects of Stimulants

- Decreased appetite
- Stomachache or headache
- Flattening or blunting of personality
- Increase in HR and/or BP
- Tremor/Tic
- Mood issues-depressed or angry
- Paranoia, hallucinations
Safe in the Long Term

**Cardiovascular** - multiple large studies have not found association with sudden death, serious CV events such as stroke, heart attack.

**Growth** - MTA study found that in treating daily over the long term 1cm of decrease in final adult height. At least 2 studies since then have not found a difference.

**Addiction Risk** - treatment with stimulants before age 9 is associated with elimination of the 2 to 3 fold increase in risk for SUD/addiction. After 9 no difference.
Long Term Stimulant Medication Benefits

In addition to reducing addiction risk:

Long term benefits in school performance- reduces the rate of repeating a grade in half

Decreases traumatic ED visits, accidents

Decreases risk of criminality in adults (ODD/CD symptoms in kids)
Summary

Diagnosis of ADHD in preschoolers and school age children requires careful evaluation but not psychological/educational testing

DSM 5 criteria should be followed carefully at all ages

Co-morbidity is common and confounds treatment (See you tomorrow PM!)

Behavioral Therapy is the first line of treatment for preschoolers with ADHD and important for school aged children. Still, it is unlikely to be the only treatment in 87% of preschoolers

Stimulants are safe, effective and should be administered with care by providers with sound clinical knowledge at doses that lead to symptom remission and improved function
Thank you