Attention-Deficit/Hyperactivity Disorder among Preschoolers and Toddlers

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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Acknowledgements

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Learning Objectives

1) Describe the current epidemiology of ADHD in preschool-aged children

   What is ADHD, who has it, and when is it diagnosed?

2) Describe the causes and developmental nature of ADHD symptoms throughout early childhood and into school-age

   When do you intervene with ADHD?

3) Describe the patterns of diagnosis and treatment of ADHD in GA for preschool and school-aged children in GA

   What are the patterns?

4) Identify the recommended intervention strategies for preschool-aged and school-aged children with ADHD and how clinicians can support those strategies

   What are the recommendations for how to intervene with ADHD among preschoolers and school-aged youth?
Attention-Deficit/Hyperactivity Disorder: A New Name for an Old Disorder

- First described in 1902
  - Sir George F. Still described a group of impulsive children with significant behavioral problems, caused by a genetic dysfunction and not by poor child rearing

- AKA:
  - Hyperkinetic Disorder
  - Minimal Brain Dysfunction
  - Minimal Brain Damage
  - And more recently: Attention Deficit Disorder
ADHD Symptoms

*Diagnostic and Statistical Manual of Mental Disorders - 5 (2013)*

- A child with ADHD might:
  - have a hard time paying attention
  - daydream a lot
  - not seem to listen
  - be easily distracted from schoolwork or play
  - forget things
  - be in constant motion or unable to stay seated
  - squirm or fidget
  - talk too much
  - not be able to play quietly
  - act and speak without thinking
  - have trouble taking turns
  - interrupt others

Attention-Deficit/Hyperactivity Disorder

Diagnostic Criteria

The Gold Standard:
*Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5)*

- **Symptom Count**
  - Inattention and/or Hyperactivity
  - Presentation types (subtypes): Inattentive, Hyperactive, Combined
- **Age of Onset (symptoms before age 12)**
- **Impairment (significant)**
- **Pervasiveness (multiple settings)**
- **Rule-Outs**

Practice Guidelines from Professional Academies

- AAP Diagnostic and Treatment Guidelines (AAP, 2011)
  - Recommendations and special considerations, by age
  - ADHD Process of Care Algorithm
- AACAP Diagnostic and Treatment Guidelines (AACAP, 2007)
AAP Guidance on Diagnosis and Management

- ADHD evaluation for any child (4-18) who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity
- Determine if DSM-IV criteria have been met
  - Symptoms and impairment in more than 1 major setting
  - Information should be obtained from parents or guardians, teachers, and other school and mental health clinicians involved in the child’s care
    - Clinician should rule out alternative causes
- Clinician should assess comorbidities
- Clinician should recognize ADHD as a chronic condition

Age-specific ADHD Treatment Recommendations from AAP: Preschoolers

- For those 4–5 years, evidence-based parent- and/or teacher-administered behavior therapy as the *first line of treatment*

- 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.

- If 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.

- The primary care clinician should titrate doses of medication.

Diagnosing ADHD in a Preschooler

- Must consider the following:
  - Disorder symptoms are still developmentally appropriate among preschoolers
  - Rapid behavioral development

- Special consideration must be paid to the level of functional impairment and frequency of symptoms
If the problematic symptoms are developmentally appropriate, is intervention appropriate?

Yes!

- The earlier that problematic behavior is identified, the earlier it can be addressed, and the less impact it may have on the child and those around them.
Biting

“My 15 month old has been biting other children at daycare for about 3 weeks now. She also did it at home for a few days. The staff and other parents are starting to get upset that she won't stop biting now and have suggested that I talk to my pediatrician.”
Growing up, my son was a combination of Curious George, Dennis the Menace, Zack Morris, and Bart Simpson rolled into one. Women I knew who had multiple children actually told me that just watching my son wore them out. The kid couldn’t sit still to save his life. He had so much energy, he was the literal embodiment of the phrase “bouncing off the walls.”
Case Study: ADHD – Toddler Years

By the time he was two years old, he’d already seen more than his share of time-outs. When I’d make him sit in a corner for whatever trouble he got into, sometimes he would turn around to face me, pouting his cherry lips and innocently blinking his big puppy dog eyes. He’d shrug his shoulders and raise his hands with his palms out. With toddler frustration, he’d whine, “Awww, come on, Mom! But I’m ohneee two!”

Day care notes:
“He took a great nap.”
“He is biting his friends again.”
“He did better with biting and only bit one boy.”
Case Study:
ADHD – First Grade

He got kicked out of his class the first day for making noises with his armpits. The teacher was well on in years, lacking patience, and couldn’t handle him. She immediately switched him into a different first-grade class. She was the first of many teachers who would get fed up with my son.

It almost seemed like he would get suspended at least once a year for silly things like throwing snowballs or playing with bang snaps.
Case Study: ADHD – Elementary Age

I remember one particular occasion when he got in trouble at school and was called down to the principal’s office. Since it was such a common occurrence, he was prepared for his usual scolding. His teacher and the principal sat him down, but instead of yelling at him, they had a heart-to-heart with him. They encouraged him and talked to him about how he was a natural leader and what that actually meant. “…the other kids in your class follow what you do and how you act,” they explained. “So when you’re good, they’re good.” These two people made such an impact on him.

He came home from school that day beaming. “Mom, I’m a leader,” he exclaimed, proud as a peacock.
Justin Bieber

Excerpts from:
Nowhere but Up: The Story of Justin Bieber’s Mom,
Pattie Mallette, 2012.
WHAT CAUSES ADHD?
What Causes The *Disorder* (ADHD)?

- We don’t really know
- Multifactorial
  - Genetic contributors (Nature)
    - DRD4, DAT, SNAP-25
  - Brain injuries
  - Environmental contributors (Nurture)
    - Environmental exposures, like lead
    - Fetal alcohol exposure
    - Prenatal maternal smoking exposure
  - Environmental triggers
    - Poor parenting practices, such as inconsistent parenting, neglect, etc.

www.cdc.gov/ncbddd/adhd/facts.html
What Causes the *Symptoms* of ADHD?

- Anatomical Differences in the Brain

- Differences in Neurochemistry
  - Thoughts
  - Actions
  - Feelings
  - Motivation
Anatomical Differences in Youth with ADHD

Anatomical Differences in Youth with ADHD

Anatomical Differences in Youth with ADHD

- Evidence of a Developmental Delay in Brain Growth and Subsequent Cortical Pruning Process
  - Multiple brain-imaging scans of 234 children with ADHD and 231 normally developing children
  - Scans beginning at 10 years and continued until 17
  - Cortical pruning happened around 13 for normally developing kids, but not until almost 15 for kids with ADHD

- Conclusions
  - Some children will “outgrow” ADHD when brain development catches up
    - Impairment may be felt long-term
  - Some children will never catch up

Neuro-Chemical Differences among those with ADHD

- At least 3 neurotransmitters are thought to be implicated
  - Dopamine
  - Norepinephrine
  - Seratonin
- Among patients with ADHD, neurological activity in the prefrontal cortex and temporal lobes is thought to be slowed
  - Halperin et al., 2006; Kobel et al., 2010
- The prefrontal cortex sorts out and organizes sensations and regulates impulses

Inside the Brain: The Neurochemistry of ADHD
At the Synapse

http://www.health.harvard.edu/newsweek/what-causes-depression.htm
What are the recommendations for how to intervene with ADHD?

WHAT THERAPIES ARE AVAILABLE TO TREAT ADHD AND HOW DO THEY WORK?
If only ADHD treatment were this easy!

**ZOOMING ZEKE**

Meet Zeke. He is always in a rush!

![Comic panels](image)

His dad says the doctor can help.

Time to go see the doctor. Zeke should take this medicine. OK

I think it will help.

A few weeks later, Zeke is playing as part of the team. He just scored a basket!

Zeke...

I thought we had basketball practice...

Not again Zeke!

Sorry pop, can't stop...

Way to go Zeke!

Awesome!
Treatments for ADHD

• Psycho-active Medication
  – Stimulants and non-stimulants

• Behavioral Therapy

• Alternative Therapies
  – Nutritional therapies
  – Chiropractic care
  – Neurofeedback, brain training
Electron Micrographic View of the Synapse

How do these therapies work?

- Those with ADHD do not transport certain neurotransmitters as effectively as those without ADHD
  - Stimulants *increase* movement of neurotransmitters into the synaptic cleft, increasing the probability of transport
  - Strattera (non-stimulant) *inhibits* the reuptake of norepinephrine
- Non-medication therapies work on neuro-chemistry too!
  - Exercise, behavioral therapy, changes in diet, etc. have all been shown to change neurochemistry (e.g., depression)

What are the Short-term Effects of ADHD Medications?

• A full standard deviation of impact on core ADHD symptoms (AAP, 2011)
• Side Effects of Stimulants
  – **Black Box**: Should not be used by those who abuse drugs, alcohol or who have heart problems
  – Tics, tremors, jitters
  – Increased pulse rate, blood pressure
  – Appetite suppression
  – Growth suppression
  – Insomnia
  – Headache
  – Nausea, stomach ache
• Side Effects of Strattera
  – **Black Box**: Suicidal ideation
  – Abdominal pain
What are the Long-term Effects of ADHD Medications?

• Despite much research, we don’t yet know
• Stimulant medications have been used widely for over 70 years and have long been considered safe
• Concern of impact on the developing brain
• Many concerns have been investigated
  – Genetic toxicity
  – Later drug abuse/addiction
  – Cardiovascular insult
  – Sudden death
Medication treatment for ADHD is a Family Decision

- Fear of stigma
- Cultural differences in the perception of mental illness
- Cultural differences in the perception of psychoactive medications
- Medical contraindications
- Concern about or experience with side effects
Who has ADHD and when is it diagnosed?

THE EPIDEMIOLOGY OF ADHD
Prevalence of ADHD among School-Aged Youth

- **National Population Estimates**
  - 6.4 million youth 4-17 years diagnosed as of 2011-2012
    - 2 million more than in 2003
  - 5.1 million with a current ADHD diagnosis, as of 2011-12

- **National Prevalence Rate (%)**
  - 11% of youth 4-17 years of age ever diagnosed
    - Up from 7.8% in 2003-2004; a 42% increase
  - 8.8% with a current diagnosis, as of 2011-12

Weighted Prevalence Estimates (%) of Attention-Deficit/Hyperactivity Disorder (ADHD) Diagnosis by a Health Care Provider among U.S. Children, by Age and Medication Status

Parent-Reported Data from the National Survey of Children’s Health

Age of Diagnosis by ADHD Severity Level

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Diagnosed ADHD Prevalence Estimates: National Survey Data

Year
Prevalence estimate (%)
0 2 4 6 8 10 12

- National Survey of Children's Health
- National Health Interview Survey

Visser et al., 2014
Akinbami et al., 2011
Akinbami et al., 2005
Visser et al., 2010
What are the patterns?

WHAT ARE THE PATTERNS OF ADHD DIAGNOSIS AND TREATMENT IN GA?
Current ADHD Diagnosis: NSCH, 2011-12

National Average: 8.8%

http://www.cdc.gov/ncbddd/adhd/prevalence.html
Current ADHD Medication Treatment: NSCH, 2011-12

National Average: 69%

http://www.cdc.gov/ncbddd/adhd/medicated.html
Diagnosed and Medicated ADHD in GA

Ever Diagnosed with ADHD:
GA, 2011-12

% Reporting ADHD

20%  15%  10%  5%  0%

2003  2007  2011

- US  Georgia

In 2011

- Current ADHD
  - 8.8% of US children
  - 9.3% of children in GA
  - Among all US states, GA ranked 25th highest

- ADHD medication treatment
  - 6.1% of US children
  - 6.1% of children in GA
  - Among all US states, GA ranked 30th highest

The GA Interagency Directors’ Team (IDT)

The IDT is a multi-agency system of care leadership collaborative that uses an integrated approach to address the needs of children and adolescents with behavioral health issues through macro level system planning.

- Department of Behavioral Health & Developmental Disabilities
- Department of Community Health
- Department of Human Services – DFCS
- Department of Juvenile Justice
- Department of Public Health
- Department of Education
- Georgia Parent Support Network
- The Carter Center
- Together Georgia
- The Center of Excellence
- *Federal Consultant – Centers for Disease Control and Prevention

gacoeonline.com/IDT
Medicaid Claims Data System: GA Dept of Community Health

- **Diagnosed ADHD (2012)**
  - # of GA children (2-12 years) enrolled in Medicaid with >= 2 ADHD Dx codes in 2012
  - % of children in Medicaid with ADHD in 2012

- **Medicated ADHD (2012)**
  - # of GA children (2-12 years) enrolled in Medicaid with >= 1 ADHD Dx code and >= 1 ADHD medication claim, using National Drug Codes for medications FDA-approved for pediatric ADHD treatment*
  - % of children in Medicaid who were medicated for ADHD in 2012

- **Behavioral Treatment (2012)**
  - # of GA children (2-12 years) enrolled in Medicaid who have received any (1+) behavioral treatment or psychological services in 2012
  - % of children in Medicaid receiving behavioral therapy for ADHD

Percentage of GA Children in Medicaid with 2+ ADHD Diagnosis Codes (2012)

Unpublished data; released in collaboration with Georgia IDT
Treatment of GA Children in Medicaid with 2+ ADHD Diagnosis Codes (2012)

Unpublished data; released in collaboration with Georgia IDT
Percentage of Children in Medicaid with 2+ ADHD Diagnosis Codes (2012), by Eligibility Categories

- Georgia Families (CMO) N=776,278: 7.3%
- Foster Care/Adopt Assist N=14,548: 29.2%
- SSI/Waiver N=33,477: 21.0%
- Other N=24,959: 2.3%

Unpublished data; released in collaboration with Georgia IDT
Treatment of Children in Medicaid with 2+ ADHD Diagnosis Codes (2012), by Eligibility Categories

- Georgia Families (CMO) N=776,278
  - BEH: 38%
  - MED: 84%

- Foster Care/Adopt Assist N=14,548
  - BEH: 69%
  - MED: 85%

- SSI/Waiver N=33,477
  - BEH: 51%
  - MED: 84%

- Other N=24,959
  - BEH: 29%
  - MED: 78%

Unpublished data; released in collaboration with Georgia IDT
ADHD Treatment among GA Preschoolers

• AAP recommends that 4-5 year olds with ADHD should receive behavioral therapy first (AAP, 2011)
  – In GA, about 5.6% of 4-5 year olds in Medicaid had 2+ ADHD diagnosis codes in 2012
  – 44% had a behavioral therapy claim, while 74% had an ADHD medication (FDA-approved) claim in 2012
  – The behavioral therapy rates are similar to older children, 6-12 years of age
  – 56% of preschoolers may not be receiving care consistent with AAP’s best practices for ADHD treatment (behavioral therapy)
ADHD Treatment among GA Toddlers

• AAP guidelines do not guide the diagnosis and treatment of ADHD among children under 4 years of age
  – In GA, about 1% of 2-3 year olds in Medicaid had 2+ ADHD diagnosis codes in 2012
  – 45% had a behavioral therapy claim, while 46% had a medication claim in 2012
  – Only amphetamine and d-amphetamine is FDA-approved for ADHD treatment for children as young as 3 years

• These medication treatment patterns are not unique to GA
National MarketScan Database: Pathways
US: ADHD Diagnosis and Medication Treatment among 2-3 Year Olds (Private Claims)

Among a MarketScan sample of 10,000,000 individuals; unpublished data

% of 2-3 Year Olds with ADHD

ADHD Meds among Dx (%)  ADHD Dx (%)

2008  2009  2010  2011  2012

0.29%  0.25%  0.27%  0.27%  0.24%

38.8%  34.4%  37.9%  31.2%  37.7%

* Among a MarketScan sample of 10,000,000 individuals; unpublished data
In 2012, approximately 1,660 toddlers in GA had 2+ ADHD diagnosis codes and about 760 of these had a claim for ADHD medication (class II controlled substances)

Only about 41% of all children 2-12 with 2+ ADHD Dx codes had a behavioral therapy/psych claim in 2012

GA data suggest areas for quality improvement in GA and beyond, particularly among GA toddlers and preschoolers

Additional research and investigation could lead to better understand about the factors influencing current practice (e.g., barriers, demands)
Evidence-based Therapies for Preschoolers with ADHD

- The Agency for Health Care Research and Quality (AHRQ) reviewed treatments for preschoolers with behavioral problems
- Recommended *parent behavioral interventions* as a good treatment option for preschoolers with ADHD, ADHD symptoms, and disruptive behavior in general
  - Help parents develop a positive relationship with their child
  - Teach them about how children develop
  - Help them manage negative behavior with positive discipline
- 4 programs for parents of preschoolers that include these key components
  - Triple P (Positive Parenting of Preschoolers program)
  - Incredible Years Parenting Program
  - Parent-Child Interaction Therapy (PCIT)
  - New Forest Parenting Programme

Unfortunately…

- These programs are not widely available
- New Forest Parenting Programme is only available in the UK
- PCIT hosts a website for state-based searches
  - http://pcit.tv/resources.asp
- Incredible Years, Triple P, and PCIT recommend “Google-ing” the program and your state for local availability
INTERVENING WHEN EVIDENCE-BASED PROGRAMS ARE NOT AVAILABLE
Components of Effective Parenting Programs

- Proliferation of parent training programs as prevention/intervention
- New uses of parent training programs
- Research Questions
  - How effective is parent training?
  - Is all “parent training” the same?
- Meta-analysis of components of effective parenting programs (0-7 years of age) with outcomes on:
  - Parent behavior & skill acquisition
  - Child externalizing behaviors
- 77 published studies

Program Components that Predicted Parent and Child Outcomes

• Average effect size = .34 (95% CI: .29-.35)
  – About one-third of a standard deviation of difference

• Most robust predictors of parent skill acquisition
  – Teaching parents relationship-building communication skills
  – Having parents practice with their own child during the sessions

• Most robust predictors of child externalizing behaviors
  – Teaching parents to interact positively with their children and provide positive attention
  – Teaching parents consistent disciplinary responding

Examples of Components that Predicted Parent and Child Outcomes

- Teaching parents to interact positively with their children and provide positive attention
  - Providing positive attention
  - Using skills that promote positive parent-child interactions, such as following child’s interests, demonstrating enthusiasm

Examples of Components that Predicted Parent and Child Outcomes

- Teaching parents relationship-building communication skills
  - Active listening
  - Helping children identify and express emotions

Examples of Components that Predicted Parent and Child Outcomes

- Teaching parents discipline & behavior management skills
  - Positive reinforcement
  - Time out
  - Consistent responding
  - Problem-solving about child behaviors

Helpful Websites

• CDC’s Essentials of Parenting
  www.cdc.gov/parents/essentials/overview.html

• CDC ADHD Web-Site
  http://www.cdc.gov/adhd/

• CDC-funded National Resource Center for ADHD
  www.help4adhd.org
CDC’s Essentials for Parenting

Overview of Essentials

Essentials for Parenting Toddlers and Preschoolers is a free, online resource developed by the Centers for Disease Control and Prevention (CDC). Designed for parents of 2 to 4 year olds, Essentials for Parenting addresses common parenting challenges, like tantrums and whining. The purpose of the resource is to provide as much information as possible on things you can do to build a positive, healthy relationship. Skills focus on encouraging good behavior and decreasing misbehavior using proven strategies like positive communication, structure and rules, clear directions, and consistent discipline and consequences.

Essentials for Parenting includes:
- Articles with a variety of skills, tips, and techniques
- “Frequently Asked Questions” answered by parenting experts

www.cdc.gov/parents/essentials/overview.html
Thank you!
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Acknowledgements

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