


**ADHD UPDATE:
CLINICAL
PRACTICE
GUIDELINES**
Presented by
Debie Pile, DNP


1 SNC 2018

2




History of ADHD

- The question always comes up...
- Where did all of these ADHD children come from anyway?
- We did not have them in "my day".




3




History of ADHD

- Symptoms of ADHD were described as early as 1798.



Palmer, E.D., & Finger, S. 2003

4




History of ADHD


Cited by an early physician named Sir Alexander Crichton in 1798.

- Took an early interest in "mental diseases"
- Wrote 3 books on this topic.

Dr. Alexander Crichton, "Mental Restlessness", (1798)




5




History of ADHD

- In the 2nd chapter of the 2nd book, he had a chapter named "On Attention & It's Diseases"
- He stated that there is a normal range of attention that is adequate to meet the needs of the individual.




6




History of ADHD

- However, he also stated he had seen many individuals with what he called "*morbid alteration in attention*".
- In these individuals, the ability to attend to a specific stimuli was either completely or significantly lacking.




7



History of ADHD


- He described the individual markers of ADHD that we use today to diagnose ADHD *as stated in the DSM- 5*
- He believed that this inability to have appropriate attention was R/T the nervous system.




8

History of ADHD

- He noted it was most pronounced in children but he had seen many cases when it persisted into adulthood in a milder form.



9




History of ADHD

This early physician:

- **did not** blame the parent's ability to parent.
- **did not** believe that these children were more able to attend and focus than what was observed.
- **did** believe that there was a true pathophysiological connection to the brain.


10



Prevalence of ADHD TODAY

- According to statistics gathered in 2016 and reported in the literature in 2017, 9.4% of all children (6.1 million) have been diagnosed with ADHD.

Danielson, M.L. et al (2018)
CDC (2017)



Children With ADHD

The Battle Within The Mind

11


12

OBJECTIVES of PRESENTATION

1. To increase evidence based knowledge about ADHD.
2. To increase understanding of the current therapeutic and pharmacological treatments of ADHD.
3. To understand the prognosis for untreated ADHD children.

13

Objective #1:
 Increase evidence based knowledge about ADHD
 There is **strong** evidence now...




14

Evidence Based Knowledge About ADHD

- What is ADHD?
- Cause of ADHD
- DSM-5 definition
- Types of ADHD
- Diagnosing ADHD
- Co-morbidities with ADHD

15




What is ADHD?

ADHD is: A common disorder...

- that begins in childhood, but often continues into adolescence and adulthood with 2 categories of symptoms...
- **Hyperactivity/impulsivity**
- **Inattention**

NIMH (2018)

16



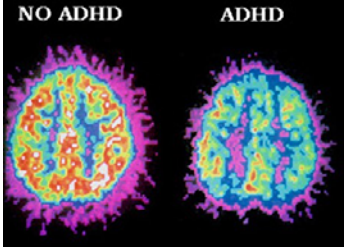
What is ADHD?

ADHD is:
 A brain-based disorder

- Brain imaging studies have shown us that the brains of children with ADHD can differ fairly consistently from those children without ADHD


Hogman, M., Bralten, J.J., Hibar, D.P., et al. (2017)

17



- Pre-frontal cortex, striatum, basal ganglia & cerebellum all tend to be small
- Brain size overall is about 5% smaller than non-ADHD

18




What is ADHD?

ADHD is:
 A brain based disorder

- There are also chemical differences in the ADHD brain.
- Lower levels of neurotransmitters, especially dopamine and norepinephrine.

Gromisch, E., (2016)

19




What is ADHD?

ADHD is:
A genetic disorder

- Studies have identified specific genes associated with ADHD and hundreds of gene variations that were not found in children without symptoms

Ella, J., Gai, X., Xie, H.M., et al. (2010)

20




What is ADHD?

ADHD is:
A genetic disorder

- Relative in the family who also had it
- At least 1/3 of all fathers who had ADHD in their youth have children with ADHD
- A majority of twins share the trait of ADHD

Bao, X.L.X., (2008)

21




What is ADHD?

ADHD is:
Linked to problems during pregnancy

- Maternal cigarette smoke
- Drugs during pregnancy
- Low birth weight
- Premies
- Prenatal stress

22



What is ADHD?

ADHD is:

- **Also linked to** head trauma, particularly injuries to the frontal lobe of the brain


Sherman, J. & Tarnow, J. (2013)

23

Diagnosing ADHD

DSM-V
Vanderbilt or Connor Questionnaires
New diagnostic tools on the horizon

24




General Definition

DSM-5

What does this look like in the ADHD child... signs and symptoms:

- A sense of inner restlessness.
- Disorganization and careless work habits.
- Inability to follow complex directions and to complete tasks.

25




General Definition

DSM-5

What does this look like in the ADHD child... signs and symptoms:

- Inability to work independently.
- Poor self-esteem.
- Poor peer relationships.
- Easily distracted by both inner and external stimuli.

26




TYPES OF ADHD

DSM-V

We Know that there are 3 types of ADHD

1. Predominately inattentive
2. Predominantly hyperactive/impulsive
3. Combined inattentive/ hyperactive/ impulsive


27




Predominately Inattentive

DSM-5

1. Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
2. Often has trouble keeping attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.




28




Predominately Inattentive

DSM-5

4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace.
5. Often has trouble organizing activities.
6. Often avoids, dislikes, or does not want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).




29




Predominately Inattentive

DSM-5

7. Often loses things needed for tasks and activities (e.g. toys, school assignments, pencils, books, or tools).
8. Is often easily distracted.
9. Is often forgetful in daily activities.



30




Predominately Inattentive


DSM-5

To fit the diagnostic criteria of the DSM-5:

Six or more of those symptoms must be present for at least 6 months to an extent that is disruptive and inappropriate for developmental level.




31




Predominately Inattentive DSM-5

INTERESTING:
Children with this type of ADHD have changes to the transporter genes for the neurotransmitter norepinephrine.



Gromisch, E. (2018)


32




Predominately Hyperactive Impulsive DSM-5

Hyperactive Symptoms

1. Often fidgets or squirms in seat.
2. Often leaves seat in situations when remaining seated is expected and runs about or climbs in situations where it is not appropriate.
3. Often unable to play or take part in leisure activities quietly.




33




Predominately Hyperactive Impulsive DSM-5

Hyperactive Symptoms...

4. Often "on the go" acting as if "driven by a motor".
5. Often talks excessively.
6. Often has trouble waiting his/her turn.



34




Predominately Hyperactive Impulsive DSM-5

Impulsive Symptoms...

7. Often blurts out answers before questions are completed.
8. Often has difficulty waiting their turn.
9. Often interrupts or intrudes on others, such as butting into conversations or games.


35




Predominately Hyperactive Impulsive DSM-5

To fit the diagnostic criteria of the DSM-5:

Six or more of those symptoms of must be present for at **least 6 months** to an extent that is disruptive and inappropriate for developmental level.



36




Predominately Hyperactive Impulsive DSM-5


Interesting...

Children with this type of ADHD had changes to their dopamine transport gene, thus affecting dopamine levels in the brain

Waldman, Rowe, Abramowitz, et al. (1998)




37




Combined: Inattentive Hyperactive Impulsive

DSM-5

- The most common type: 50-60% of children with ADHD have this type
- Combination of both types
- For the DSM-V diagnosis:
 - **The diagnostic criteria of both A and B must be met for 6 months**



38




Combined: Inattentive Hyperactive Impulsive


DSM-5

Interesting...

Children with this type of ADHD have decreases in transporter genes for both norepinephrine and dopamine.



39




More Diagnostic Criteria

DSM-5

- Some symptoms that cause impairment were present before age 12 years.
- Some impairment from the symptoms is present in two or more settings (e.g. at school/work and at home).

40




More Diagnostic Criteria

DSM-5

- There must be **clear evidence** of clinically significant impairment in at least 2 of the following areas:
 - Social settings, school, or home.
- **The symptoms:** are not better accounted for by another mental disorder.

41




Diagnosing ADHD

• **How is the data assembled?**
Questionnaire assessment forms for parents and teacher to form a collateral history

1. **Vanderbilt Assessment Scales**
2. **Connors 3rd Edition ADHD Assessment**

42



Diagnosing ADHD

• **How is the data assembled?**

- Both look for the co-morbidities of anxiety & depression.
- Very important to look at *history over time*.

43




New Diagnostic Strategies


- As of July 15, 2013, the FDA approved marketing of the first medical device based on brain function to help assess attention-deficit/hyperactivity disorder in children and adolescents aged 6 to 17 years.
- Called the NEBA System.
- Based on analysis of theta beta ratios in the brain.

44

NEBA SYSTEM



45




New Diagnostic Strategies

NEBA System: Neuropsychiatric EEG-Based Assessment Aid System

- A 15-20 minute non-invasive test that calculates the ratio of beta and theta brain wave frequencies.
- Some studies have suggested that theta and beta ratios are higher in children and adolescents with ADHD.

Arns, M., Conners, C.K. and Kraemer, H.C., (2013)

46




New Diagnostic Strategies

May 2013:

Study found that parent-reported cases of attention-deficit/hyperactivity disorder diagnosis in their children *may be a more accurate method* for monitoring state and national based prevalence of the disorder than previously thought.

Getahun et al, 2013; Jacobsen, S.J., Fassett, M.J., et al. (2013)

47



New Diagnostic Strategies

For now, considered investigational and unproven as the only diagnostic criteria

Current recommendation: utilize standardized diagnostic methods and use TBR as a secondary process if desired.

Snyder, S., Rugino, T., Hornig, M., & Stein, M. (2015)


48

Co-Morbidities with ADHD

Learning disabilities

Psychosocial disorders including bipolar disorder, anxiety disorders and depression

49




Co-Morbidities With ADHD

Learning Disabilities

- Higher incidence of learning disorders in children with ADHD than in general population of children.
- Present in 70% of children with ADHD.
- Disability in written expression two times more common (65%) than a learning disability in reading, math, or spelling.

50




Co-Morbidities With ADHD

Learning Disabilities

- More severe learning problems than children who had LD but no ADHD
- More severe attention problems than children who had ADHD but no LD.
- Further, children with ADHD but no LD still had some degree of learning problem
- Higher incidence of dyslexia in children with ADHD

Mayes, S.D., Calhoun, S.L., & Crowell, E.W. (2000)

51



Co-Morbidities With ADHD


Higher incidence of psychosocial disorders than in general population of children

- Bi-Polar Disorder
- Anxiety Disorders
- Depression

The morbidity rate for these disorders increases in untreated teenagers.

Sherman, J. & Tarnow, J. (2013)

52



Co-Morbidities With ADHD


| | |
|---|-----|
| Any mental, emotional, or behavioral disorder | 64% |
| Behavior or conduct problem | 52% |
| Anxiety | 33% |
| Depression | 17% |
| Autism spectrum disorder | 14% |

Note: Adapted from CDC Data & Statistics ADHD

53

Objective 2:

To increase understanding of current therapeutic and pharmacological treatments of ADHD



54

Therapy or Medication?

All children with ADHD do better with both

So...
What therapies?
What meds?



Therapy or Medication?

Therapies for parents to consider:

- Behavioral
- Cognitive
- Family
- Interpersonal



Therapy or Medication?

- **Goal of Behavioral Therapy:**
 - Teach more adaptive behaviors.
- **Goal of Cognitive Therapy:**
 - To help child replace dysfunctional thinking with more positive thoughts.
 - "I can't do anything right." vs. "This is really hard for me."

Therapy or Medication?

- **Goal of Family Therapy**
 - Teach family members skills in helping child organize & function.
 - Parenting classes.
 - No yelling, no hitting + rewards.
- **Goal of Interpersonal Therapy**
 - Teach social skills with peers to help them interact socially in a more successful way.



Therapy or Medication?

Medication is essential in the treatment of ADHD!

- Remember... it has a biological basis with neurotransmitter abnormalities.
- Not giving meds for ADHD is like asking the diabetic to make his own insulin.



Therapy or Medication?

This is the life of the ADHD child without meds:

- Marked impairment in school success.
- Ca not follow routine instruction from teachers to "sit down, take out your math book, turn to page 4 and answer the first 10 questions." *Always in trouble!*
- Inability to fit in with peers: good boy/bad boy.
- Seen as a troublemaker.



Therapy or Medication?

- Erikson's Theory of Personality Development & ADHD
- **Children from 6-12: Industry Vs. Inferiority**
 - Children in elementary school are in this stage.
 - This is also the age that ADHD is most detrimental to their success.

Erikson: Industry vs. Inferiority School Age Child

- **Positive resolution:**
 - Develops a sense of competence and perseverance.
 - Focus of stage is achievement & accomplishment, & mastery.
 - Learns to compete, to cooperate, & to follow rules.
 - *Inability to meet goals causes child to develop sense of inadequacy.*

Therapy or Medication?



- Their self esteem is destroyed by the time they leave elementary school behind.
- They do not believe they CAN succeed.
- They start looking for escape.
- **If we do not medicate appropriately in these years, these children will medicate themselves in middle school and high school.**

Therapy or Medication?



- Proper pharmacological treatment reduces the symptoms of ADHD hyperactivity and inattention by 75-80%!
- **With these outcomes, why would we not want these kids on meds?**

National Resource Center on ADHD (2015)

Medications



Medications fall into one of 3 categories:

1. Stimulants
2. Amphetamines
3. Non-stimulants

MEDICATIONS

Stimulants
Amphetamines
Non-stimulants
Adverse reactions

Medication Recommendations



- **1st Line:** Stimulants
- **2nd Line:** Amphetamines
Both work by stimulating dopamine and norepinephrine in the brain.
- **3rd Line:** Non-stimulants
Action different for each drug.



1st Line Medications

Drug Names of Short Acting Stimulants:

- Ritalin (methylphenidate)
- Methylin (methylphenidate)
- Focalin (dexemethylphenidate)

All are methylphenidate. The molecule has been slightly altered to make them different from each other.



1st Line Medications

Drug Names of Long Acting Stimulants:

- Ritalin LA
- Focalin XR
- Daytrana Patch
- Concerta
- Metadate CD
- Methylin ER

All are methylphenidate molecular variations. Can be given in the a.m. for all day assistance.



1st Line Medications

The pros and cons between the short acting and long acting:

- Long acting can be taken once in the morning so child does not have to go to the health room.
- Short acting can be more effective.
- Short acting has sharper spikes and valleys.



2nd Line Medications

Drug Names of Amphetamines:

- Adderall XR
- Dexadrine
- Vyvanase... the newest one

All are dextro-amphetamine.

As in stimulants, the molecule is altered slightly to create the different drugs.



2nd Line Medications

Common side effects of amphetamines and stimulants:

- Headache... transient
- Stomach ache...transient
- Decreased appetite
- Irritability
- Difficulty sleeping
- Dry mouth



2nd Line Medication Potential Side Effects

Decreased appetite

- Dose after meals, even though better efficacy if given 30 mins. before meals.
- Frequent snacks.

Irritability

- Decrease dose.
- Try another stimulant.

2nd Line Medication Potential Side Effects Short Acting

Sleep problems

- Firm bedtime routine.
- Move late afternoon dosing (only if needed) to earlier time.

Behavioral rebound

- Try longer acting form.
- Add a small dose in afternoon.



2nd Line Medications

Infrequent side effects of amphetamines and stimulants:

- Weight loss
- Dizziness
- Growth suppression
- Tics
- Increased HR & B/P

**BE SURE THE CHILD HAS NO CARDIAC PROBLEMS:
No ventricular, no atrial, no vascular problems**



3rd Line Medications

Drug Names of Non-Stimulants

- **Strattera**
 - Useful for children who do not tolerate stimulants or amphetamines.
 - Causes a significant stomachache that many children cannot tolerate.



3rd Line Medications

Drug Names of Non-Stimulants

- **Intuniv (guanfacine)**
 - Extended-release formulation of the high-blood pressure medication.
 - *Can be used alone or along with stimulant medications in children ages 6 to 17.*
 - Not clearly understood how this helps ADHD.
 - **Side effects:** *drowsiness, stomachache, dry mouth and weight gain.*



Medications

Medications used but not indicated:

- **Catapres (clonidine)**
 - Med used for hypertension.
 - Balances the activity of certain brain receptors.
 - Side effects: dry mouth, constipation.


Now has STRONG RECOMMENDATION from AAP



3rd line: Medications

- **Nuvigil (armodafinil and Kapvay)**
 - Used in narcolepsy previously.
 - **Long acting form** of Kapvay and armodafinil
 - Wakefulness-boosting stimulant.
 - Enhances motivation and focus.
 - Shown to boost mental performance.
 - Side effects: headache, insomnia.

79




3rd Line Medication

Medications for ADHD:
 Anti-depressants that are not labeled for <18 yrs.

- Wellbutrin XL and Wellbutrin SR
- Cymbalta
- Effexor
- Celexa

Have all shown benefit in reducing symptoms of ADHD. Added benefit of treating depression in ADHD kids.

80




Medications

- Some ADHD kids CAN be explosive and accelerate from frustration to rage.
- Anti-psychotics are often prescribed.

Anti psychotics are much more dangerous to use as side effects are significant and require close monitoring!


81



Medications

- Risperdal & Seroquel: similar SE profile**
 - Parkinsonism
 - Metabolic changes including DM & weight gain
 - Hyperprolactinemia & gynecomastia
 - Leukopenia & neutropenia
 - Priapism
 - Dysphagia & dyspepsia

82



Medication Concerns

Concern is valid about the drugs we use.

- It is not something that should be undertaken carelessly or without skill of the prescriber.
- Each class of drug has its own side effect profile and risks and benefits.
- Often... mild side effects just need a patient parent.

83



Medication Concerns


- With appropriate dosing and monitoring, these drugs can be safely used.
- ADHD children benefit so much from them that we need to be willing to use them wisely.

It is no fun to fail at everything you try to do everyday of your life.


84

Objective #4:
 To understand the prognosis for untreated children with ADHD

What can we predict about their future?



85




The Future

Much depends on:

- Whether the child was properly diagnosed early.
- Whether the child was treated in therapeutic ways by family and teachers.
- Whether the child received pharmacological help.


86



The Future: Untreated ADHD

- Only 37% of children with untreated ADHD graduate from high school.
- Only 5% receive a college degree.
- Teens with untreated ADHD are more likely to engage in high risk behaviors, including MVA's, unsafe sex, vandalism and stealing.

87



The Future

Children do not outgrow their ADHD

- The hyperactivity tends to fade, but the other symptoms do not.
- We are just now beginning to understand the complexity of problems associated with adult ADHD.


88

The Future

FACT:

IT REALLY DOES MATTER THAT WE RECOGNIZE AND TREAT CHILDREN WITH ADHD APPROPRIATELY.

89




Interesting....

Theoretically... from an evolutionary standpoint:

- This may also be an adaptive disorder.
- Risk taking behaviors are a part of ADHD.
- Not good at managing things, but are more willing to take on dangerous assignments... great hunts, great travels, etc..

In truth, ADHD has many strengths outside the classroom.

90



Interesting....

- One paper reviewed actually suggested that we have a higher incidence of ADHD in the US because of the characteristics of ADHD.
- Who else would be more willing to leave a quiet life in a small town and jump on a ship to America than the risk taking ADHD adult.
- It reminds us... there are some very positive things about ADHD too.

References

- Arns, M., Conners, C.K. and Kraemer, H.C. (2013). *A decade of EEG theta/beta ratio research in ADHD: a meta-analysis*. J Atten Disord, 17(5): 374-83.
- Centers for Disease Control and Prevention (2017). *Data and statistics attention-deficit/hyperactive disorder*. CDC 24 (7). Retrieved from [www.https://cdc.gov/ncbddd/adhd/data/html](https://cdc.gov/ncbddd/adhd/data/html)
- Danielson, M.L., Bitsko, R., Gandour, R., et al. (2018). *Prevalence of parent-reported ADHD diagnosis and associated treatment among U.S. children and adolescents*. Journal of Clinical child and adolescent psychology, 47 (2).

References

- Ella, J., Gai, X., Xie, H.M., Perin, et al. (2010). *Rare structural variants found in attention-deficit hyperactivity disorder are preferentially associated with neurodevelopmental genes*. Molecular Psychiatry, 15, (6), 637-646.
- Bao, X.L.X. (2008). *An overview of the genetics of ADHD*. Acta Psychological Sinica, 40 (10), pp. 1088-1089.
- Crichton, (1798). *An inquiry into the nature and origin of mental derangement*, Volume 1, "Mental Restlessness". London: Caddell, T. Junior & Davies.
- Getahun, D., Jacobsen, S.J., Fassett, M.J., et al. (2013). *Recent trends in childhood attention-deficit/hyperactivity disorder*. JAMA Pediatr, 167(3): 282-288.

References

- Gromisch, E. (2016). *Neurotransmitters involved in ADHD*. Retrieved from [www.https://psychologycentral.com/lib/neurotransmitters-involved-in-ADHD-7-3-2018](https://psychologycentral.com/lib/neurotransmitters-involved-in-ADHD-7-3-2018)
- Kessler, R.C., Chiu, W.T., Demler, O., Walters, E.E. (2005). *Prevalence, severity, and comorbidity of twelve month DSM-IV disorders in the National Comorbidity Survey, Replication, (NCS-R)*. Archives of General Psychiatry, 62, 617-27.
- Hogoman, M., Bralten, J., Hibar, D.P., et al. (2017). *Subcortical brain volume differences in participants with attention deficit hyperactivity disorder in children and adults: a cross-sectional mega-analysis*. Lancet Psychiatry. (17) 30049-4. Doi:10.1016/S2215-0366

References

- Palmer, E.D., & Finger, S. (2001). *An early description of ADHD (Inattentive Subtype): Dr. Alexander Crichton and the "Mental Restlessness"*. Child and adolescent mental health. 6 (2): 66-73.
- Mayes, S.D., Calhoun, S.L., & Crowell, E.W. (2000). *Learning disabilities and ADHD: overlapping spectrum disorders*. J. Learning Disabil, Sep-Oct: 33(5): 417-24.
- National Resource Center on ADHD. (2015). *Managing medication for children and adolescents with ADHD*. Retrieved from [www.https://chadd.org/portals/0/content/CHADD/NRC/Factsheets/medication.pdf](https://chadd.org/portals/0/content/CHADD/NRC/Factsheets/medication.pdf).

References

- NIMH. (2017). *Attention-deficit/hyperactive disorder (ADHD): The basics*. Retrieved from [www.https://nimh.nih.gov/health/publications/attention-deficit-hyperactive-disorder-adhd-the-basics/index.shtml](https://nimh.nih.gov/health/publications/attention-deficit-hyperactive-disorder-adhd-the-basics/index.shtml).
- Palmer, E.D., & Finger, S. (2001). *An early description of ADHD (Inattentive Subtype): Dr. Alexander Crichton and the "Mental Restlessness"* (1798). *Child Psychology and Psychiatry Reviews*, 6, 66-73.
- Sherman, J. & Tarnow, J. (2013). *What are common comorbidities in ADHD*. Neurology Times, 30(8). Retrieved from [www.https://psychiatrictimes.com/adhd/what-are-common-comorbidities-adhd](https://psychiatrictimes.com/adhd/what-are-common-comorbidities-adhd).

References

- Snyder, S.M.I., Quintana H., Sexson S.B., et al. (2008). *Psychiatry Res*, June 30;159(3): 346-58.
- Visser, S.N., Danielson, M.L., Bitsko, R.H., Perou, R., & Blumberg, S. (2013). *Convergent validity of parent-reported-attention-deficit/hyperactivity disorder diagnosis: A cross-study comparison*. JAMA Pediatr, 167(7): 674-675.
- Waldman, I.D., Rowe, D.C., Abramowitz, A. et al. (1998). *Association and linkage of dopamine transporter gene and attention-deficit hyperactivity disorder in children: Heterogeneity owing to diagnostic severity*. The American Journal of Human Genetics. 63(6): 1767-1776.

References

- Wilens, T.E., Faraone, S.V., Biederman, J. & Gunawardene, S. (2003), *Does stimulant therapy of attention-deficit/hyperactivity disorder beget later substance abuse? A meta-analytic review of the literature*. *Pediatrics*, 111, 129-185.