Practical care of the Child with ADHD
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Objectives
- Know the DSM 5 Criteria for diagnosis of ADHD
- Identify 4 Comorbidities of ADHD
- Be familiar with the common ADHD medications and Side Effects
- Understand a variety of behavioral strategies to help with symptoms of ADHD

Etiology- Multifactorial
- Genetics
  - twin studies suggest 76% heritability
  - 92% monozygotic, 33 % dizygotic
  - Appears to be not a single gene but non-specific genomic variants are noted and overlap with autism, schizophrenia and mood disorders
  - Affected genes are involved in catecholamine metabolism (imbalance)
Environment

- Associations but not causal
- Prenatal and perinatal exposures
  - Prematurity
  - Prenatal substance exposure- drugs, alcohol, smoking, lead, pesticides
- Psychosocial risks
- No recognized association with nutrition

Biological Mechanisms
not yet Understood

- Functional MRI- Abnormalities in the function of neural networks in response to cognitive testing
- White matter alterations in microstructure leading to reduced global activation
- Structural differences in the brain- asymmetry of the caudate nucleus (responsible for coordinating multiple brain areas), smaller cerebral and cerebellar volume especially in the anterior brain

Role of neurotransmitters

- Genetic imbalance of catecholamine metabolism
- Animal studies suggest Dopamine and noradrenergic neurotransmitters involved
  - Noradrenergic system is involved in modulation of higher cortical functions
  - ADHD patients have higher DA transporter density resulting in clearing of DA too quickly
- Decreased availability of Dopamine in the extracellular and synaptic space
- Methylphenidate increases extracellular DA, Straterra inhibits NE reuptake
Core Symptoms

- Hyperactivity
- Impulsivity
- Inattention

DSM 5 Criteria

- Greater than 6 symptoms of hyperactivity or impulsivity
- Or greater than 6 symptoms of inattention
- The symptoms must
  - Occur often
  - Persist for more than 6 months, be present before age 12 years
  - Impair function in school, social or occupational activities
  - Be excessive for the developmental stage of the child
  - Other conditions that could account for the symptoms must be excluded

Hyperactivity

- Inability to sit still, fidgetiness
- Difficulty sitting still, running or climbing
- Teens- feelings of restlessness
- Difficulty playing quietly
- Excessive talking
- Usually noted by age 4, peak age 7-8
- Less obvious in the teen years
Impulsivity

- Act before they think
- Interruption or intrusion of others
- Difficulty waiting turns
- Blurt out answers too quickly
- Avoids tasks that require sustained mental work or are frustrating

Inattention

- Failure to pay attention to details
- Doesn’t seem to listen
- Difficulty organizing tasks, belongings – loses or forgets things needed for school or activities
- Easily distracted
- Forgetfulness
- Often not recognized until age 8-9

Difficulty with Executive Functioning

- Poor control of emotions and impulsivity
- Organizational difficulties
- Problems with working memory
- Difficulty with planning and setting priorities
- Trouble with problem solving
Challenges

- Increased risk of injury or unsafe situations
- Social difficulties - don’t recognize social cues leading to peer rejection and adult disapproval
- Academic failure or difficulties
- Substance abuse, depression, difficulties in the workplace and driving
- Increased mortality - due to accidents

Comprehensive Evaluation

- Need information from multiple sources about core symptoms for diagnosis
- Medical history - prenatal exposures, perinatal complications, coexisting disorders, developmental milestones, other causes of school difficulties
- Family history including ADHD, school achievement and cardiac history
- ROS - including sleep and appetite

Physical

- growth, vital signs
- dysmorphisms or signs of coexisting medical disorder
- vision and hearing
- Neurologic evaluation
- Observation of child’s behavior and parental interactions
Developmental and behavioral functioning

- Developmental milestones
- Onset of symptoms
- Functioning in different settings or activities
- Functional impairment—behavior problems, homework issues, getting tasks completed
- Psychosocial stressors

School Functioning

- Rating scales
- Report cards
- Teacher comments
- School psychoeducational evaluations

Behavior Rating Scales

- Vanderbilt Assessment Scale
  - validated in community settings
  - ok to use age ≥ 4
  - Included in NICHQ ADHD toolkit and can be downloaded and printed for free
- Connors Comprehensive Behavioral Rating scale
  - Validated in pre-school aged children
  - Primarily validated in referral settings
Comorbidities

- Up to ½ of children with ADHD have coexisting conditions
- Can be either primary or secondary
  - Anxiety
  - Depression
  - Learning Disabilities
  - Autism
  - Oppositional Defiant Disorder
  - Conduct Disorder
  - Tic Disorder
  - Substance abuse

Psychometric Testing

- Not required to make diagnosis of ADHD
- May be useful in assessing for associated learning disabilities
- May help rule out another diagnosis that may be impairing educational success
- May identify areas of strengths and weaknesses to develop a treatment plan personalized for that particular child

Differential Diagnosis

- Developmental variation- gifted, energetic or mild intellectual disability but not interfering with function
- Developmental conditions- LD, Language disorder, Autism
- Neurodevelopmental syndromes FAS, fragile X, Klinefelters
- Sequelae of CNS insult - trauma, infection
- Metabolic disorder
- Mental illness- anxiety, depression, DDD, CD, OCD, PTSD
- Environmental- stressful or neglectful home environment
- Medical- vision or hearing, lead exposure, sleep disorder, substance abuse
Treatment of ADHD in Preschool Children

Behavior Therapy is first line:
- Parent training:
  - Schedules, reminders, organization, set achievable goals and reward success, consequences in calm manner, find successful activities, avoid unwanted secondary gain.
- School Management
  - preferred seating, modified work assignments, behavioral plans
- Medication indicated if:
  - at risk of injury to self or others, strong FH, interferes with learning/therapy, at risk of expulsion form school or daycare
  - Short Acting methylphenidate starting at 2.5 mg bid
  - Increase up to 7.5 mg/kg tid

Choosing a Medication

- Stimulants are considered 1st line and appear equally effective
- 70% response rate (80% if more than 1 stimulant is tried)
- Choose based on your experience, parent preference, timing and ability to swallow pills
- Atomoxetine is an alternative
- Alpha adrenergics can be used as an add on and are especially useful for children with Tic disorder, overly aroused, easily frustrated, overly active and aggressive
- Concerns with substance abuse- use vyvance, concerta or methylphenidate patch
Titration

- Start at lowest dose expected to have an effect
- Increase weekly until the core symptoms have been reduced by 50% or an adverse effect occurs
- Beneficial to start on a weekend so parents can watch for an adverse effect
- Useful to have teacher do a scale before and after for objective evidence of effect
- Shorter duration of effectiveness might mean an inadequate dose.

Adverse Effects of Stimulants

- Decreased appetite
- Slowed growth- decreased 1-2 cm long term
- Dizziness
- Insomnia
- Mood lability or rebound
- Tics
- Psychosis
- Diversion and misuse
Adverse Effects of other medications

- Atomoxetine
  - Initial somnolence
  - GI upset
  - Increase in suicidal thoughts (less common)
  - Hepatitis (rare)
- Alpha adrenergic agonists:
  - Somnolence
  - Dry mouth

Cardiac Concerns

- Sudden cardiac death in children is extremely rare. Studies do not support that stimulant medication increases the risk of sudden death
- Family and personal history of long QT, WPW, FH of hypertrophic cardiomyopathy or sudden cardiac death should be explored
- AHA and AAP state ECG is not recommended if no history of cardiac concerns

Treatment Failure- consider:
- Adherence
- diversion
- Realistic expectations
- Comorbidity or wrong diagnosis

Termination of Therapy- consider:
- Individual risk/benefits
- Trial off medication- supervised
Non Pharmacologic Treatment

- Behavioral therapy - parent training in strong behavioral management skills, school behavioral plans
- School programming - school home communication, classroom adaptations (preferred seating, modified work assignments, extra time)
- 504 plan or IEP
- Organizational skills training
- Social skills training
- Individual counseling

IEP vs 504 Plan

**IEP - special education plan**

- A child must have one or more of the 13 specific disabilities listed in the IDEA law
- The disability must affect the child's educational performance and/or ability to learn and benefit from the general education
- Consists of a written document describing services child is entitled to

**504 Plan**

- Section 504 of the federal civil rights law to stop discrimination against public school students with a disability.
- A child has any disability or health issue, which can include many learning or attention issues.
- The disability must interfere with the child's ability to learn in a general education classroom.
- Section 504 has a broader definition of disability
- No standard for 504 plans

Resources

- **Parents:**
  - www.additudemag.com
  - Understood.org
  - aacap.org
  - CHADD.org
  - NAMI.org
- **Clinicians**
  - NICHD ADHD toolkit