Oh I Forgot!
Let's Focus on ADHD

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History of ADHD

1902: ADHD first described
1923: ADHD could result from head trauma
1937: Benzadrine (amphetamin.e) to treat childhood migraine
-Found benefit for attention & behavior issues
1962: Ritalin – approved for kids
1967: National Institute of Mental Health
-First study to assess effect of stimulants on hyperactive children
1970's: Cylert, Dextrostate, & Dexedrine
1980's: Ritalin Slow Release
1990 to present: Stimulant & non stimulant treatment

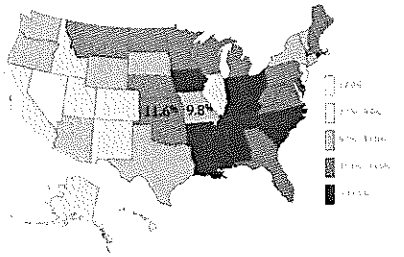
Center for Disease Control & Prevention (CDC), (2017)

Objectives

Participants will

- Self report, via electronic evaluation, increased confidence in working with patients who need common pharmacologic management for ADHD

State Based Prevalence Data



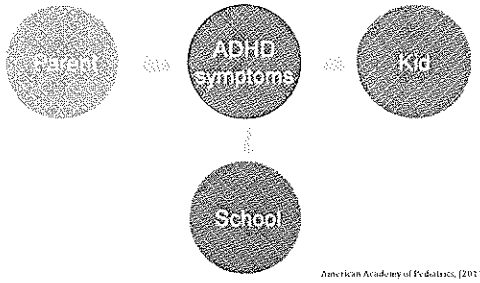
Percent of Kids Aged 4-17 Ever Diagnosed with Attention-Deficit/Hyperactivity Disorder

CDC, (2017)

Disclosures

- I have no pertinent financial disclosures
- Information provided here is for on label application
- This presentation is for educational purposes only & is not a substitute for an individual's judgment or a clinicians practice protocol

ADHD is a Clinical Diagnosis



American Academy of Pediatrics, (2011)

- Psychological & neuro-psych testing may be useful in complicated clinical presentations; however, testing is NOT typically indicated for the routine evaluation & diagnosis of ADHD.
- A thorough clinical interview & evaluation is the st&ard.

American Academy of Pediatrics, (2011)
American Psychiatric Association, (APA) (2013)

DSM-V Diagnostic Criteria: ADHD

- Loses things necessary for tasks or activities
  - House key, homework, textbooks, phone…
- Easily distracted by extraneous stimuli
  - Noise in the classroom (talking, pencil tapping), or for teenagers unrelated thoughts
- Forgetful in daily activities
  - Chores (dishes, trash, feed animals)
    - Brush teeth, flush toilet

APA, (p. 59, 2013)

DSM-V Diagnostic Criteria: ADHD

Inattention Symptoms (at least 6 symptoms required for patients 16 & younger; 5 symptoms for 17 & older)

- Fails to give close attention to details or makes careless mistakes in schoolwork, etc.
  - Missed details, rushes through work, doesn't read or fully read the instructions
- Difficulty sustaining attention
  - Boring activities, "lectures, conversations, lengthy reading"
- Does not seem to listen when spoken to directly
  - Daydreaming, "mind seems elsewhere"

APA, (p. 59, 2013)

PBS: Misunderstood Minds

DSM-V Diagnostic Criteria: ADHD

- Does not follow through on instructions & fails to finish schoolwork, chores, etc.
  - Easily sidetracked, doesn't complete activity/chore
- Difficulty organizing tasks & activities
  - Struggles with sequential activities, messy, poor time management
- Avoids tasks requiring sustained mental effort
  - School work, homework, writing papers

APA, (p. 59, 2013)

ADHD Diagnostic Criteria (cont.)

- Hyperactivity-Impulsivity Symptoms (at least 6 symptoms required)
  - Fidgets with hands/feet or squirms in seat
  - Leaves seat in classroom or in other situations in which remaining seated is expected
  - Runs about or climbs inappropriately
  - Difficulty playing or engaging in activities quietly

APA, (p. 60, 2013)

ADHD Diagnostic Criteria (cont.)

Hyperactivity-Impulsivity Symptoms

- Often "on the go" or acts as if "driven by a motor"
- Talks excessively
- Blurts out answers
  - Tries to finish others sentences
- Difficulty waiting in lines or awaiting turn
- Interrupts or intrudes on others

APA, (p. 60, 2013)

Gender Differences

Boys	Girls
• More hyperactivity	• Less hyperactivity
• More disruptive	• Less disruptive
• More externalizing behaviors	• More internal
• ADHD more common in boys	• Girls diagnosed with combined type are often seriously impacted

Loeber & Keenan (1994)

ADHD Diagnostic Criteria (cont.)

- Symptoms present before age 12
- Clinically significant impairment in social or academic/occupational functioning
- Some symptoms that cause impairment are present in 2 or more settings
  - School, home, recreational settings
- Not due to another disorder
  - Anxiety, Mood Disorder, ODD, or Autism

APA, (2013)

Girls ADHD

- Hyperactivity is easily identified, but not inattention
  - Rating tools can be skewed to hyperactivity
- Outcomes for girls can be more serious than what boys experience
  - Academics
    - Lower academic expectations
  - Social
    - Inattentive girls may be ignored
    - Hyperactive girls may be excluded/avoided
- Social & cultural expectation of girls to be cooperative & compliant
  - Seen & not heard

Subtypes

- Combined Type
  - Inattentive & hyperactivity/impulsivity
    - Most common subtype
- Inattentive Subtype – more difficult to diagnose
  - Clinical levels of inattention only
  - Often not identified until middle school
    - Executive functioning demands increase
    - Kids have insight to report/endorse symptoms
- Hyperactive/Impulsive Subtype
  - Very young & more common prior to starting school

APA, (2013)

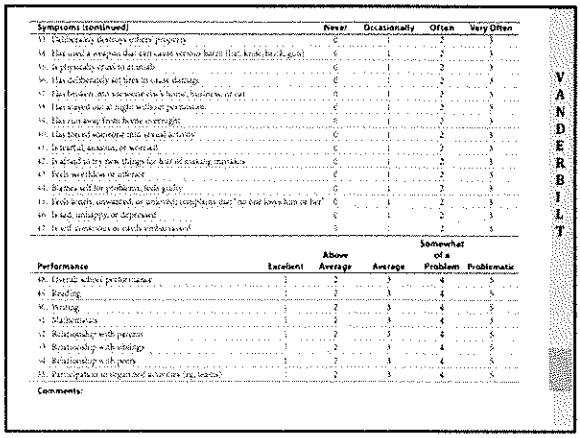
Sleep Issues

- Hyper arousal at bedtime
  - I need a drink
  - I need a snack
  - I need to use the bathroom
  - I need a hug
  - I need you
- Once asleep, hyper kids typically stay asleep

Clinical Pearl

-Girls with ADHD can change their clothes a lot & throw their clean clothes in the dirty laundry

-Room cleaning is a major problem because its hard to sequence & follow through



Symptoms (continued)	Never	Occasionally	Often	Very Often
33. Deliberately destroys others' property	0	1	2	3
34. Has used a weapon that can cause serious harm (bat, knife, brick, gun)	0	1	2	3
35. Is physically cruel to animals	0	1	2	3
36. Has deliberately set fires to cause damage	0	1	2	3
37. Has broken into someone else's home, business, or car	0	1	2	3
38. Has stayed out at night without permission	0	1	2	3
39. Has run away from home overnight	0	1	2	3
40. Has forced someone into sexual activity	0	1	2	3
41. Is fearful, anxious, or worried	0	1	2	3
42. Is afraid to try new things for fear of making mistakes	0	1	2	3
43. Feels worthless or inferior	0	1	2	3
44. Blames self for problems, feels guilty	0	1	2	3
45. Feels lonely, unwanted, or unloved; complains that "no one loves him or her"	0	1	2	3
46. Is sad, unhappy, or depressed	0	1	2	3
47. Is self-conscious or easily embarrassed	0	1	2	3

Performance	Excellent	Above Average	Average	Somewhat of a Problem	Problematic
48. Overall school performance	1	2	3	4	5
49. Reading	1	2	3	4	5
50. Writing	1	2	3	4	5
51. Mathematics	1	2	3	4	5
52. Relationship with parents	1	2	3	4	5
53. Relationship with siblings	1	2	3	4	5
54. Relationship with peers	1	2	3	4	5
55. Participation in organized activities (eg, teams)	1	2	3	4	5

Comments:

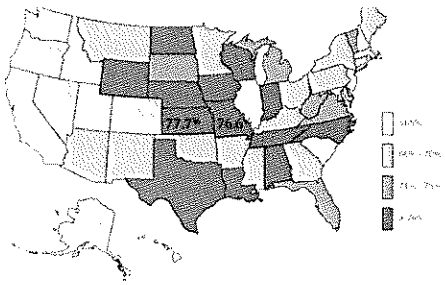
V A N D E R B I L T

Assessment Tools

V&erbilt
- Parent & teacher scales
- 47 questions / 15 minutes to fill out
- Assesses
  - Inattention & hyperactivity
  - Conduct & oppositional defiant qualities
  - Anxiety traits
  - Performance ratings

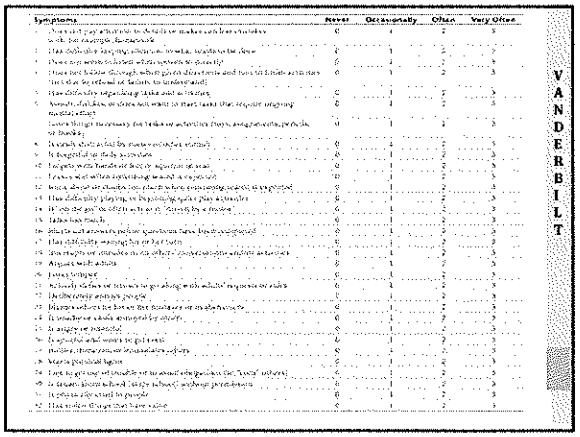
Conner's Rating Scale
- Proprietary
- Clinician dependent

State Based Prevalence Data



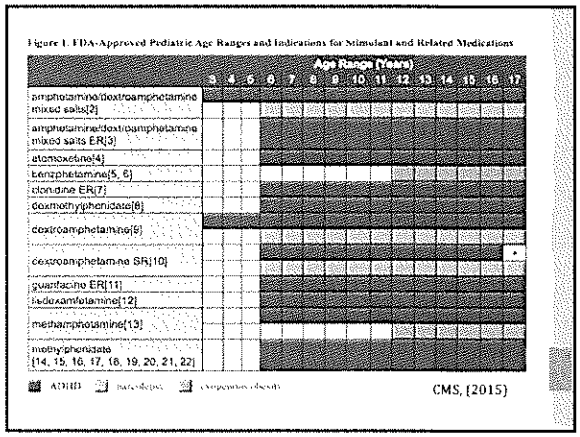
Kids Aged 4-17 Currently with ADHD Receiving Medication Treatment

CDC, (2017)



Symptoms	Never	Occasionally	Often	Very Often
1. Does not pay attention to details or makes careless mistakes with homework or other activities	0	1	2	3
2. Has difficulty keeping attention to what needs to be done	0	1	2	3
3. Does not seem to listen when spoken to directly	0	1	2	3
4. Does not follow through when given directions and fails to finish activities (not due to refusal or failure to understand)	0	1	2	3
5. Has difficulty organizing tasks and activities	0	1	2	3
6. Avoids, dislikes, or does not want to start tasks that require ongoing mental effort	0	1	2	3
7. Loses things necessary for tasks or activities (toys, assignments, pencils, or books)	0	1	2	3
8. Is easily distracted by noises or other stimuli	0	1	2	3
9. Is forgetful in daily activities	0	1	2	3
10. Fidgets with hands or feet or squirms in seat	0	1	2	3
11. Leaves seat when remaining seated is expected	0	1	2	3
12. Runs about or climbs too much when remaining seated is expected	0	1	2	3
13. Has difficulty playing or beginning quiet play activities	0	1	2	3
14. Is "on the go" or acts as if "driven by a motor"	0	1	2	3
15. Talks too much	0	1	2	3
16. Blurts out answers before questions have been completed	0	1	2	3
17. Has difficulty awaiting his or her turn	0	1	2	3
18. Interrupts or intrudes on others (eg, butts into conversations or activities)	0	1	2	3
19. Argues with adults	0	1	2	3
20. Loses temper	0	1	2	3
21. Actively defies or refuses to go along with adults' requests or rules	0	1	2	3
22. Deliberately annoys people	0	1	2	3
23. Blames others for his or her mistakes or misbehaviors	0	1	2	3
24. Is touchy or easily annoyed by others	0	1	2	3
25. Is angry or resentful	0	1	2	3
26. Is spiteful and wants to get even	0	1	2	3
27. Bullies, threatens, or intimidates others	0	1	2	3
28. Starts physical fights	0	1	2	3
29. Lies to get out of trouble or to avoid obligations (ie, "cons" others)	0	1	2	3
30. Is truant from school (skips school) without permission	0	1	2	3
31. Is physically cruel to people	0	1	2	3
32. Has stolen things that have value	0	1	2	3

V A N D E R B I L T



CMS, (2015)

Methylphenidate (MPH)

Drug	Dose	Peak / Duration	Profile
Methylphenidate Immediate-release *(Ritalin, Methylin)*	*Tablets* 5, 10, 20mg *Chewable* 2.5, 5, 10mg *Liquid* 5mg/5mL, 10mg /5 mL	• Onset 20 min. • Early peak • 4 hrs.	• TID dosing • Start 5mg • MAX 60mg
Methylphenidate Sustained-Release *(Ritalin SR, Methylin SR, Metadate ER, generic SR)*	*Tablets* 10, 20mg	• Onset 30 min. • 4-6 hrs.	• Once per day or BID dosing • Use in stead of IR • Start 10mg • MAX 60mg
Methylphenidate ER Concerta Aptensio	*Tablets* 18, 27, 36, 54mg	• Onset 30 min. • 8-12 hrs.	• Once daily • Start 18 - 27mg • MAX 72mg

ADHD: Kids age 6 & older MPH is up to 2mg/kg per day

Leehey, (2017), Stahl, (2014)

Dextroamphetamine

Dexedrine *D. Amphetamine*	*Tablet* 5, 10mg	• Onset 20-30 min.
		• Peak 2 hrs..
		• Duration 4 hrs..
			• Stronger & longer duration than MTH
			• Start: Ages 3-5
			  • 2.5mg per day
			• Ages 6+
			  • 5-10mg day
			• BID – TID
			  • MAX 40mg

Dexedrine Spansules SR	*Capsule* 5, 10, 15mg	• Onset 60-90 min.. • Peak 1-2 hrs.. • Duration 8 hrs..	• Once daily • Less rebound than in IR • 50% IR + 50% XR • MAX 40 mg
ProCentra	*Liquid* 1mg/mL	• 20-30 min. • Duration 4-6 hrs.	• Start, ages, & dosing same as Dexedrine

Leehey, (2017), Stahl, (2014)

Methylphenidate (MTH)

Drug	Dose	Peak / Duration	Profile
Metadate CD	*Capsule* 10, 20, 30, 40, 50, 60mg	• Early peak • 8hrs..	• Once daily • Metadate: 30% IR + 70% ER
Ritalin LA	*Capsule* 10, 20, 30, & 40mg	• Two strong peaks (early & at 4 hrs.). • 8-12 hrs.	• Ritalin LA: 50% IR + 50% ER • Start 20mg • MAX 60mg
Aptensio XR	*Tablets* 10, 15, 20, 30, 40, 50, 60mg	• Onset 30-45 min. • 8-12 hrs..	• Once daily • 40% IR + 60% XR • Beads: sprinkled on food • Start 10 mg • MAX 60mg
Quillivant XR	*Liquid – time release* 5mg/5mL	• Onset 30 min. • 12 hrs..	• Once daily • 30% IR + 70% ER • Start 20mg • MAX 60mg
Quillachew ER	*Tablets* 20, 30, 40mg (20 & 30 are scored)		

Leehey, (2017), Stahl, (2014)

Dextroamphetamine + Amphetamine

Drug	Does	Peak / Duration	Profile
Adderall IR • *Mixed Amphetamine Salts* • *D, L Amphetamine*	*Tablet double scored* 5, 7.5, 10, 12.515, 20, 30mg	• Onset 30-60 min. • Peak 1-2 hrs.. • Duration 6-8 hrs..	• BID-TID dosing • Start 5-10mg per day • 25/75 Levo/Dex • MAX 30-40 mg
Adderall XR	*Capsule* 5, 10, 15, 20, 25, 30mg	• Duration 10-12 hrs..	• 50% IR + 50% XR • MAX 30mg
Evekeo IR	*Oral disintegrating tab* 5, 10mg	• Onset 30 min. • Duration 4-6	• Similar to Adderall IR • 50/50 Levo/Dex
Adenys XR ODT	*Oral disint. tab* 3.1, 6.3, 9.4, 12.5, 15.7, 18.8mg	• Onset 30 min. • Duration 10-12 hrs..	• Similar to Adderall XR • Only disintegrating XR

Leehey, (2017), Stahl, (2014)

Methylphenidate (MTH)

Drug	Dose	Peak /Duration	Profile
Daytrana Transdermal Patch	*Patch* 10, 15, 20, 30mg 10 = 1.1 mg /hr 15 = 1.6mg /hr 20 = 2.2 mg/hr 30 = 3.3mg/hr	• Onset 1 hr • Peak 8 -10 hrs. • Duration up to 2 hrs., after removal • Remove after 8-12 hrs..	• 1 patch per day to hip. • Avoid oral dosing • OTC topical steroid for skin irritation • MAX 30mg
Focalin Dexmethylphenidate	*Tablet* 2.5, 5, 10mg	• Onset 30 min. • Duration 4-5 hrs..	• BID dosing • Start 5mg BID • MAX generally 20mg per day
Focalin XR	*Tablet* 5, 10, 15, 20, 25, 30, 35, 40mg	• Onset 30-60min. • Peak 90 min. & 4 hrs.. • Duration 8 hrs..	• Once Daily • Start 5-10mg • 50% IR + 50% XR • MAX 40mg

Leehey, (2017), Stahl, (2014)

D, L Amphetamie & Lisdexamfetamine

Drug	Dose	Onset/Duration	Profile
Dynavel XR	*Oral suspension* 2.5mg/ml 1ml = 1cc	• Onset 30 min. • Duration 10-12 hrs..	• Similar to Adderall XR in liquid form • No refrigeration • Once a day • Start 2.5mg • Max 20mg

LisdexamFetamine

Vyvanse lisdexamfetamine	Capsule 10,20, 30, 40, 50, 60, 70mg	• Onset 30 min. • Duration 8-12 hrs..	• Pro Drug = lower diversion • Once a day • Can be dissolved in water, yogurt, OJ • Start 20-30mg • Max 70mg

Leehey, (2017), Stahl, (2014)

Stimulant Side Effects

More Common
- Decreased appetite
  - Typically at lunch
- Rebound hunger in evening
- Delayed sleep onset
  - Often associated with taking late in the day
- Anxiety that subsides

Less Common
- Headache
- Stomach ache
- "Whiney" as med wears off in afternoon
- Irritability "meaner"
- Weight loss
- Tics
  - Eye blinking
  - Nose scrunching
  - Mouth opening

Leehey, (2016)

Non Stimulant

Kapvay: Clonidine ER

- FDA approved from ADHD
- Dosing:
  - 1st week: 0.1 mg at HS
  - 2nd week: 0.1mg BID
  - MAX: 0.1mg q am & 0.2mg q HS
- Monitor BP when starting & discontinuing medication

Non Stimulant

Strattera (Atomoxetine)
- Norepinephrine reuptake inhibitor
- Tablets: 10, 18, 25, 40, 60, 80, 100mg
- Kids ≤ 70kg
  - 0.5mg/kg/day - after 3 days - 1.2 mg/kg/day
  - Starts at HS- typically sedating
  - Divided doses once acclimated to medication
- Kids ≥ 70kg
  - 40mg @ HS
  - Increase in 3-5 days in divided doses

Non Stimulant

Tenex /Guanfacine IR
- Dose 0.5mg - 4 mg per day
- Start - 0.5 - 1mg depending on age

Intuniv / Guanfacine XR
- 1mg - 4 mg per day
- Start 1mg for one week, 2mg second week...
- Take one month to titrate to 4mg

Profile
- Longer half life than Clonidine - improved tolerability
- Dose at HS to increase tolerability
- Monitor BP when starting & discontinuing medication

Non Stimulant

Clonidine: Oral & transdermal patch (Catapres-TTS)
- 0.05mg to 0.4mg
- Start 0.05mg @ HS
- Titrate over 2-4 weeks
- Monitor BP closely, especially when discontinuing
- Helpful for "hyper-arousal"

NOTE: High risk of medication error r/t decimal point
Order tablets as 0.1mg - Take ½ tablet...

Prescription Medical Food

Vayarin (Lipirinen): Diet therapy
- Reportedly
- DHA (Omega-3 fatty acid docosahexaenoic acid)
  - Critical to brain health & functioning
  - Declining levels may play a role in poor cognition

Lauritzen, et al., (2016)

- Children with ADHD typically have lower level of Omega-3 LC-PUFA
  - Long chain Polyunsaturated fatty acid
  - Reported to increased DHA bioavailability in the brain
    - Omega 3 = 19% bioavailability
    - Vayarin = 43% bioavailability
  - Takes up to 90 days to build up in the system

Vayarin, (2017)

Starting Pharmacotherapy

What to Consider

Cardiac Risk Assessment
- Rates for sudden death in patients treated with stimulant & persons in the general population are similar
- Conflicting data as to whether stimulants increase risk of cardiac events. Hamilton et al. (2009)

Baseline EKG
- Child & family history of heart problems
- Kids under 6 years
- Practice protocols

How to Start

Parent/Child Preferences
- Formulation
- Dosing options
- Social issues
  - Older kids don't like going to the school nurse
  - Kids at risk for misuse or diversion
- Establish tolerability
- Start lowest dose or lowest does that you think is going to be effective

Older Child Case

Lana: 12 y/o, 5th grade
- Grades deteriorated as the expectation for her to be more responsible & organized increased
  - Procrastinates doing her work –Reads & can't remember what she read
  - Forgets to do her homework &/or forgets to put it in her backpack &/or forgets to return work to her teacher
- 62" tall; 115 lbs; healthy, no cardiac history, no sleep problems, no anxiety
- Taking Methylphenidate ER 18mg
  - Improvement noted, but not sufficient. Evenings are rough
- PLAN
- Increase MTH ER 27mg + MTH 5mg at 4pm

Behavioral Management

Kids: Learn to control themselves & promotes self efficacy
- Most effective in kids ≤ 6 y/o when provided at home by parent
- Strategies to simplify/shorten/emphasize tasks
- Positive & negative reinforcement

Advantages
- Enduring benefit without side effects
- May be important as children reach adolescence & become less likely to continue their medication

Disadvantages
- More effort-intensive & more expensive than medication
- Access to therapy - fewer mental health providers
- Adherence rates are low

Felt et al., (2011)

Young Adolescent

Jayden: 14 y/o, 8th grade – Middle school
- Treated for ADHD since the 3rd grade
- Has been on MTH, Focalin, & most recently Adderall
- Takes Adderall XR 30mg for six months
- Adderall helpful, but loses efficacy in early afternoon
- Plays sport after school & is really struggling to focus
- Dreads doing his homework, parents have to closely monitor
- 56", 150 lbs., healthy, no cardiac history, no sleep problems
- PLAN
  - Continue Adderall XR 30mg
  - Start Adderall XR 10mg at 12 noon

Young Child Case

Liam: 5 years old, 1st grade
- Frequent trouble in kindergarten for bossing peers or pushing while standing in line; Liam wants to be first
- His level of hyperactivity gets on his families nerves
- Unable to settle down at night
  - In & out of bed. Takes a hour to get him to sleep
  - Once asleep, Liam stays asleep
- 85th percentile, healthy, no family history of heart problems, EKG is normal
- PLAN:
  - Dexedrine 5mg q am & titrate to AM & 12 noon
  - Consider Dexedrine 2.5mg at 4pm
  - Melatonin to help ease into sleep. If ineffective consider adding low dose clonidine or guanfacine at bedtime

Adolescent Case

Aden: 17 y/o senior in HS
- Has been treated for ADHD since the 5th grade
- Diagnosed with Generalized Anxiety in 10th grade
  - Took SSRI & stopped due to sexual side effect
- GAD- worries make it difficult for him to get to sleep
  - 1-2 hour delay
  - Has limited electronics prior to bedtime
  - Tired in the morning
- 72", 170 lbs, healthy, no cardiac history
- Taking Vyvanse 50mg q day with "okay" results
- PLAN
  - Intuniv 1mg at HS for 7 nights then increase to 2mg at HS & continue through next appointment. Target dose is 3-4mg

Case To Refer

Isaac: 8 y/o, 2nd grade

- ADHD, C; ODD, & Fetal Alcohol Syndrome
  - Very hyperactive, hyper verbal, has poor frustration tolerance, & poor impulse control
  - Difficult to manage in the classroom. Gets angry when he can't have his way
  - Irritability & reactivity more consistent with a mood disorder, but grandma down plays that as "just being a boy"
- 50th percentile for height & weight, EKG is normal
- PLAN
  - Start Adderall 5mg AM & 12 noon; Start Tenex 0.5mg at HS
    - Recommended MTH due to less likely to cause agitation
    - Grandma preferred Adderall - "I've heard stories about Ritalin"
    - 3 weeks later - STOP Adderall due to increased anger & aggression

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Summary

- ADHD is brain-based disorder that can result in lifelong impairment in functioning.
- Stimulant medications with behavior therapy is evidence-based treatment for ADHD.
- Combined treatment has the greatest impact on normalizing social, academic, & vocational outcomes.

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Questions