Overview

The Problems
- ADHD and Executive Functions
- Co-Occurring Problems of the Syndrome Mix
- Family Problems

Four Rules of Treatment
1. Keep it positive
2. Keep it calm
3. Keep it organized
4. Keep it going (keep doing 1-3)

CAM/Medications

ADHD:
The Traditional, Boring Definition

Triad of:
- Inattention
- Hyperactivity
- Impulsivity

Six or more symptoms of inattention
(a) fails to give close attention; careless mistakes
(b) difficulty sustaining attention
(c) does not seem to listen when spoken to directly
(d) easily distracted by extraneous stimuli
(e) difficulty organizing tasks
(d) fails to follow through (not volitional/incapable)
(f) avoids tasks requiring sustained motivation
(g) loses things needed for tasks
(i) often forgetful in daily activities
Six or more symptoms of hyperactivity-impulsivity

Hyperactivity
(a) fidgets/squirms
(b) leaves seat
(c) runs or climbs excessively
(d) difficulty playing quietly
(e) “on the go” or “driven by a motor”
(f) talks excessively

Impulsivity
(a) blurs out answers
(b) difficulty waiting turn
(c) interrupts or intrudes

DSM: 3 Types of ADHD

• ADHD, Predominantly Inattentive Type
• ADHD, Predominantly Hyperactive-Impulsive Type
• ADHD, Combined Type

Typical, Boring and Useless Description of ADHD

“Johnny is very active! He never stops moving. He gets distracted by any little noise, and has the attention span of a flea. Often, he acts before he thinks. His sister, Jill, is often in a fog. Sometimes, she’s just so spaced!”

More Accurate Description

“I can’t take it any more!! We scream all morning to get out of the house. Homework takes hours. If I don’t help him with his work, he’s so disorganized that he’ll never do well. If I do help him, he screams at me. Since he never finishes anything, everyone thinks he doesn’t care….”
No matter how much we beg or punish, he keeps doing the same stupid things over and over again. He never considers the consequences of his actions, and doesn’t seem to care if they hurt me. It’s so easy for him to get overwhelmed. Sometimes, he just wants to ‘turn the noise off.’

He is so inflexible, and then blows up over anything. It gets me so angry that I scream back, which makes everything even worse. Now that he’s getting older, the lies and the cursing are getting worse, too. I know he has trouble paying attention, but why does he have all of these other problems as well?

Psychiatry Hotline

“If you have…”

OCD
Schizophrenia
Paranoid
Depressed
ADHD
New Concept of ADHD: A Problem with Inhibition

- There is deficient frontal and pre-frontal lobe function in ADHD.
- These pre-frontal lobes are the home of our executive and braking functions.
- ADHDers show executive dysfunction and brakeless behaviors.

Neurophysiology of ADHD

- Too little NE driving the frontal lobes.
  - “Frontal lobe brakes haven’t been woken up.”
- Too little DA from frontal inhibitory projections onto the striate and other areas.
  - “Frontal lobe brakes are weak.”
- MRI, fMRI, PET scans, blood flow studies, and EEGs all show decreased frontal lobe function.
- Twin studies show that genetic factors control up to 75 to 97 percent of a person’s risk for ADHD.

ADHD: Neurobiology
New Definition of ADHD

• The inability to inhibit the present with an eye to the future. –Russell Barkley
• “Living RIGHT NOW!!!”

Executive Function (EF)

(Russell Barkley)

• Frontal lobe (executive) functions:
  – Inhibition (brakes)
  – Orchestrating the brain (CEO)
  – Self talk
  – Working memory
  – Initiation
  – FORESIGHT/Hindsight
  – Shifting agenda
  – Adding/separating emotion to/from fact
  – Regulating self to recognize/meet the needs of others.
Inhibition / Brakes

Most basic EF is putting on brakes.

1. We need to be able to inhibit distractions/impulses/hyperactivity. (see picture below)
2. Unless we stop first, never get to use other EFs.

CEO

• “Self” is a barely coherent collection of parallel processes.
• When speech or memory centers used, we become aware.
• No one is in charge.
• Frontal lobes try their best to orchestrate.
• ORGANIZE.

Self-Talk

• Toddlers do it out loud.
• ADHDers never get to practice.
• ADHDers don’t internalize self talk.
• poor problem solving.
**Working Memory**

- What we can juggle electrically.
- 2 gigabytes of RAM
- Need to access past, present, and future simultaneously.
- Not exercised without brakes in ADHD.

**Initiation, Execution, Completion**

- Getting started.
- Huge problem in ADHD.

“For a moment, nothing happened. Then, after a second or so, nothing continued to happen.”


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**Foresight**

- Ability to predict and plan for the future.
- Poor without ability to inhibit present or keep the future in working memory.
- ADHD: prisoners of present.
- Poor foresight is perhaps greatest disability of ADHD.
- (Mothers typically have great foresight.)

**Hindsight**

- Ability to recall success of past strategies.
- ADHDers don’t learn from their mistakes!

“You live and learn. At any rate, you live.”

—Douglas Adams. *Mostly Harmless*
Sense of Time

• Extremely poor in ADHD.
• Poor estimates.
• Time moves too quickly.
• Time moves too slowly.

Shifting Agenda

• Switching requires sustained effort and control.
• Difficult in ADHD.
• Kids need warnings.

Difficult Behaviors in ADHD

<table>
<thead>
<tr>
<th>Symptom</th>
<th>ADHD Children (%)</th>
<th>Typical Children (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argues with adults</td>
<td>72</td>
<td>21</td>
</tr>
<tr>
<td>Blames others for own mistakes</td>
<td>66</td>
<td>17</td>
</tr>
<tr>
<td>Acts touchy / easily annoyed</td>
<td>71</td>
<td>20</td>
</tr>
<tr>
<td>Swears</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>Lies</td>
<td>49</td>
<td>5</td>
</tr>
<tr>
<td>Stealing (not involving threats)</td>
<td>50</td>
<td>7</td>
</tr>
</tbody>
</table>

Nocturnal Eneuresis ⇔ ADHD

• NIH study of 1,106 children 8-11 y.o.
• Overall 12 mo. eneuresis prevalence = 4.45%.
• Odds ratio of ADHD/control = 2.88.
• Overall, 40% of enuretics had a type of ADHD.
• Children with nocturnal enuretics should be evaluated for ADHD and vice versa.

ADHD & Substance Abuse

• Decade f/u of 200 ADHD boys/girls age 6-17 y.o.
• ADHDers had 1.47 x risk of substance disorder.
  • Alcohol: 27% ADHD vs 22% control
  • Drug: 20% vs 10%
  • Cigarette: 27% vs 12%
• Risk factors: conduct/mood disorders; ongoing ADHD.
• ADHD med use => no change in substance use.
  – Meta-analysis showed 1.9 fold decreased risk with stimulants. (2)
• Counsel starting 5th grade.

--Wilens T. Does ADHD predict SUDs? A 10 year f/u study of young adults. AACAP. 2013
--Brown= July 2011
(2) Wilens T: Does Stimulant Therapy of AD/HD Beget Later Substance Abuse? A Meta-analytic

Driving & Stimulants: Don’t Leave Home without It

• ADHD pts. are at higher risk of accidents/serious accidents/license suspensions
• Driving simulation study of 61 young adults w ADHD.
• Those rx’d with lisdexamfetamine for 5 wks reacted:
  – 9% faster to startle events.
  – 67% less likely to have a collision during a driving
    simulation than those who received placebo.
• Clinical response to med. did not correlate w/ driving.

(Medscape.com)

ADHD 33 Yr F/U of 133 pts

<table>
<thead>
<tr>
<th></th>
<th>ADHD (mostly untreated p adol)</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>% post High School deg.</td>
<td>3.7%</td>
<td>29.4%</td>
</tr>
<tr>
<td>Jobs</td>
<td>83.7% but at $40K less</td>
<td></td>
</tr>
<tr>
<td>Divorce</td>
<td>31.1%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Adult ADD</td>
<td>22.2%</td>
<td>5.1%</td>
</tr>
</tbody>
</table>

--Klein RG. Clinical and Functional Outcome of Childhood Attention-Deficit/Hyperactivity Disorder 33 Years Later. Arch Gen Psychiatry. 2012
(Medscape.com Oct 2012)

Co-Occurring Conditions of the Syndrome Mix

• Learning Disabilities, incl. Organization
• Anxiety
• OCD
• Tics
• Depression
• Bipolar Depression
• Autistic Spectrum Disorders
• Sensory Integration Disorder
• Central Auditory Processing Disorders (CAPDs)
ADHD: Co-Morbidity Risks
Survey of parents >5000 children with ADHD

<table>
<thead>
<tr>
<th>Co-Morbidity</th>
<th>% of ADHDers</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Dis.</td>
<td>46 %</td>
<td>7.79</td>
</tr>
<tr>
<td>Conduct Dis.</td>
<td>27 %</td>
<td>12.58</td>
</tr>
<tr>
<td>Anxiety</td>
<td>18 %</td>
<td>7.45</td>
</tr>
<tr>
<td>Depression</td>
<td>14 %</td>
<td>8.04</td>
</tr>
<tr>
<td>ASD</td>
<td>6 %</td>
<td>8.72</td>
</tr>
<tr>
<td>Tourette's</td>
<td>1.3%</td>
<td>10.70</td>
</tr>
</tbody>
</table>


ADHD: Comorbid Conditions

ADHD: Number of Co-Morbidities
• 2/3 had at least 1 co-morbidity.
• 1/3 had at least 2 co-morbidities
• 1/5 had at least 3 co-morbidities
• Other studies show even higher risk.
• Increasing number ⇨ decreasing function


Family Problems
• Family members with their own problems.
• Household is stressed by child. ↩(Dads come home)
Family stress may lead to resentment

Classic ADHD: Just the Tip of the Iceberg

- Classically defined ADHD
- Other Executive Dysfunctions
- Co-Occurring Problems
- Family Problems

Okay, he has ADHD, but why…?

And let’s not forget the positive. ADHD people…

- Have an envious “Why not?” attitude.
- Live in the present.
- Often have extreme passion.
- Can be very creative.
- Can be lots of fun.

Solutions
Rule 1. Keep it positive.

Show that You Love Your Child
(Ed Hallowell, Superparenting for ADD)

- “These are the kids who need your love the most, because they get it elsewhere the least.”
- “A parent ought to be a child’s first and greatest fan.”
- May not be easy at some periods, but find something to praise.
- Hang in there. It can take decades before the results show.

Positive: Bank Account

- Imaginary bank account of good/bad times.
- Keep the bank account positive.
  - Laugh/hug.
  - Spend time together without being annoying!
  - Accept apologies.
  - Take the good times as they come.
  - Find something to praise.

Phelan’s 4 Cardinal Sins

- Don’t nag. It hasn’t worked yet.
- Don’t lecture. Ditto.
  - “Insight transplants” don’t work.
- Don’t argue. It takes two.
- Don’t offer unscheduled advice.

I.e., if it’s not useful, don’t do it.
Nice Traffic Cop

• Imagine you get pulled over for speeding.
• The policeman gives you the ticket AND starts calling you lazy and worthless….
• When we hand out the punishments, let’s leave the nasty comments behind.

The “No Fault” Approach (Zeigler-Dendy)

Avoid arguments based on “whose fault.” …

• This is the rule.
• It was broken.
• This is the pre-set consequence.
• I feel your pain.

Benefits of No Fault

• Avoids arguments.
• Good with people who refuse to accept blame. (There is no blame.)
• Allows us to criticize the behavior, not the child.
• Might occasionally be unfair, but good in the long run.

Maintain a Disability Outlook

• Cuts through “blame.”
• Parents/teachers become “therapists” not “victims.”
• Realistic outlook minimizes frustration.
  – Frustration occurs when outcome <> expectations
Rule 2.
Keep it calm

ADHD: Effect of Increasing D1 Agonist on Working Memory

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Just STOP!

- ADHD is deficiency of frontal lobe brakes.
- First step is to STOP.
- It works! Even 5-10 minutes.
- Once under control:
  - Correct choice is obvious to child.
  - Correct parenting is obvious to parent.

Plan B:
Behavior modification via staying calm to prevent “meltdowns.”

“Just STOP!”

The Overwhelmed Speedometer

- Imagine a stress speedometer
- At 60 mph, back wheels spin out and crash is inevitable.
- Inherit child at 40mph.
  - “Calming” brings to 30mph ➔ keep at it.
  - “Calming” brings to 50mph ➔ stop before spinout.
After stopping, next:
Defuse, don’t inflame:
• Lower your voice. Stay calm.
• State rule once.
• Leave.
• Ignore the ravings of an out-of-control blob of neurons.

Discussion will resume later when it can be useful. You are not giving in.
Once calm: negotiate, negotiate, negotiate.

Collaborative Problem Solving
(Ross Greene, The Explosive Child)
1. Child states his problem; adult empathizes.
2. Adult states her problem.
3. Child is invited to start a win-win, doable negotiation.

One more time:
Your ADHD child is much more likely over-whelmed than evil.
He/she would do well if they could. (R. Greene)
• Evil behaviors need to be squelched.
• Over-whelmed behaviors need to be calmly defused.
Rule 3. Keep it organized

It’s about organization, ….  
- Disorganization is built into the diagnostic criteria.
- Are you grading knowledge of physics/algebra/French, or grading organizational skills?
- It’s a disability.

Disorganization

“I love deadlines. I love the whooshing noise they make as they go by.”

--Douglas Adams, *The Salmon of Doubt*
Notebook Organization

• One 3-ring binder for all subjects.
• One bifold homework folder
  – One side for coming home
  – One side for going to school
• Monthly calendar
  – www.timeanddate.com/
• Assignment book

Rule 4:
Keep it going!

ADHD: Complementary & Alternative Medicine (CAM)

• CAM used by 12-68% of ADHD pts.
• Only 11-64% disclose their use to their doctor.
• No CAM meet AAP criteria for evidence based treatment, but essential fatty acids may play a small role.

Complementary and Alternative Medicine (CAM)

- **Iron deficiency** (even wo anemia) can effect attention and cognition.
- **Megavitamins** are not helpful and may be harmful. (25% incr. of disruptive behavior, 40% have incr. serum transaminase.)
- **Sugar**: “Several recent studies, as well as a meta-analysis, have failed to demonstrate a significant assoc. between sugar and behavior.”

--- Chan E. The Role of CAM in ADHD. Dev and Behavioral Ped. 2002: Vol 23, Num 1S.

Feingold (K-P) Diet

- Eliminate salycilate foods, artificial food colors and flavors
- 6 uncontrolled studies: Effect size 0.344 (small)
- 17 controlled studies: Effect size 0.089 (non-imp’t)
- May be small percentage of children with improved hyperactivity during short term study, or a small subset with allergy.


Omega-3 Fatty Acids

- Alter cell membrane fluidity and phospholipid content.
  - Alters neurotransmission of serotonin and NE (esp. frontal lobe)
- Only 2/10 studies showed beneficial effect.
- However, meta-analysis showed small benefit: about 1/3 the effect size (0.31) of stimulants (0.78).
- Can be used as add-on or for families who decline traditional medications.
- Further studies needed.

--- M. Bloch, JAACAP 2011 50 (10) 991-1000

Neurofeedback (NF) May Work

- Neurofeedback: watched video games or films while receiving feedback trying to enhance beta (16-20hz) and suppress theta (4-7hz).
- 3 sessions/week for total 30 sessions (1/2 hr each).
- and/or methylphenidate 1mg/kg b.i.d.
- 275 referrals. 120 agreed to trial. 91 finished.
- NF vs. meds vs. combined: all major effect on hyperactivity (ES 1.75 to 2.88)
  - Less but sig. effect on inattention.
- Did not confirm prior studies that combined is best.
- Explained by time with therapists, CBT, motivation of pts agreeing to trial, and eval by parents reports.

ADHD: Effect Sizes of Diff. Rx

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphetamines</td>
<td>1.0</td>
</tr>
<tr>
<td>Methylphenidate</td>
<td>0.75</td>
</tr>
<tr>
<td>Atomoxetine</td>
<td>0.59</td>
</tr>
<tr>
<td>Intuniv</td>
<td>(0.5)</td>
</tr>
<tr>
<td>Omega 3 oil (2)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>Neurofeedback (3)</td>
<td>(0.21) est. vary</td>
</tr>
<tr>
<td>Behav Parent Training</td>
<td>0.25-0.30</td>
</tr>
</tbody>
</table>

Summary of Drug Actions

<table>
<thead>
<tr>
<th></th>
<th>ADHD</th>
<th>OCD</th>
<th>Anxiety</th>
<th>Tics</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulants</td>
<td>A+/-worse</td>
<td>+/-worse</td>
<td>+/-worse</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SSRI’s</td>
<td>0</td>
<td>A</td>
<td>A+</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>TCA</td>
<td>B</td>
<td>0</td>
<td>B</td>
<td>0</td>
<td>0 (child)</td>
</tr>
<tr>
<td>Neuroleptics</td>
<td>+/-0</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>0</td>
</tr>
</tbody>
</table>

Neurophysiology of ADHD

- Too little NE driving the frontal lobes.
  - “Frontal lobe brakes haven’t been woken up.”
- Too little DA from frontal inhibitory projections onto the striate.
  - “Frontal lobe brakes are weak.”
**Some stimulant side effects**

- Insomnia
- Loss of appetite
- Rebound
- Tics (better, same, or worse)
- ?Minimal growth suppression?
- Does not increase substance abuse in people with ADHD; may cut risk in half.
- ??cardiac/stroke

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**ADHD: Tics and Stimulants**

- % worsening of tics in 136 children w/ ADHD and chronic tics:
  - MPH 20 %
  - Clonidine 26 %
  - Placebo 22 %

- Tic severity dec. in all active rx groups:
  - CLON & MPH > CLON alone > MPH alone


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**ADHD Meds and Tics**

Despite FDA/longstanding concerns, a meta-analysis of 9 db/pa studies (477 pts<18) showed:

- Methylphenidate, alpha-2 agonists, and atomoxetine were effective in treating ADHD w/ comorbid tics, w/o worsening tic severity.
- Alpha-2 agonists (ES=0.74) and atomoxetine (ES=0.32) improved comorbid tics.
- Only supratherapeutic doses of dextroamphetamine increased tic severity.
- Note: ADHD sx precede tics by 2-3 years.
- (Still controversial!)


(Brown Oct 2009)
ADHD Meds: Misuse & Diversion:

Misuse

Past year prevalence in 21 studies including 113,145 youth:
- Misuse (not prescribed to or misused by child)
  - 5% to 9% in grade school- and high school-age.
  - 5% to 35% in college-age individuals.
    - 1/2 to study better.
    - 1/3 to get high or experiment.


Diversion

- Diversion (transfer to another child)
  - 16% of grade school and high school students were asked to give, sell, or trade their meds.
  - 23% of a college-age sample were approached.
  - 11% of adult ADHD individuals had sold their medications during the past 4 years.


Pop Quiz

A 13-year-old son with ADHD discovers that his bite-plate is missing from its handy container. He angrily accuses everyone else of having taken it. His mother explains the blatantly obvious fact that no one else would be interested in his used dental appliance. He continues screaming and blaming her for its absence.

Question 1

This child is demonstrating good executive function.

a) True
b) False
Question 2

The accusatory behavior of this otherwise bright child can best be explained by:

a) He’s not quite smart enough to comprehend that his bite-plate isn’t worth stealing.

b) He’s overwhelmed by frustration.

Question 3

Yelling back and accusing your child of behaving horribly would:

a) Prompt him to say, “Oh, thanks for helping me see the error of my ways.”

b) Cause him to be even further overwhelmed.

Question 4

An initial attempt at helping him solve the problem is unsuccessful. A *useful* parental response at this point would be:

a) Keep escalating the screaming match.

b) Stop, walk away, retain your composure, and resist the urge to get in the last word. Resume discussion when everyone is calm.

Question 5

This type of outrageous behavior in your ADHD child:

a) Is a common part of the brakeless behaviors we summarize with the letters ADHD.

b) Is the result of a nasty and selfish child.
Conclusion

• This is the 50 year plan.
• Have some fun.
• The winner is the family/classroom that stays together.
ADHD: Stimulants and CV events

- 1.2 million Medicaid children with 386,584 having at least one claim for stimulants.
- 95 events (SUD, MI, CVA, ventricular arrhythmias).
- 2.2 events/100,000 pt years on stimulants.
- 3.5 events/100,000 pt years off stimulants.
- Note: short term treatment; does not eval for possible long term increased BP and Pulse rates


ADHD: Cardiac Monitoring

- Pulse increases of 1-5 beats/min.
- BP increases of 1-5 mm Hg.
- Up to 15% of children are “outliers.”
- No significant EKG changes.

- 15% of pediatricians get an EKG before stimulants.

ADHD Personal Policy

- PERSONALLY, as of today:
  - I suggest EKG on all my stimulant pts.
  - I get cardio consult for any PE/hx/fm hx (incl deafness)
  - I can get cardio consult for athlete on stimulants.
  - EKG should accompany Hx/PE for sports clearance. 'ECHO?'
  - Among NCAA Division I male basketball players, 1:3,100 SCD/yr.
  - 0.2 to 0.7% of competitive athletes have underlying risk for SCD.
  - Of 115 cases of SCD, 1 (0.9%) were identified in Hx/PE.
    - Among SCD in young athletes, what is the role of screening. Current Opinion Cardiology. 2013