ADHD:

Diagnosis and Treatment

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Objectives (by the end of this session, you will be able to…):

1. List diagnostic criteria and one screening tool for ADHD.

2. Describe the risks and benefits of stimulant and non-stimulant medications used to treat ADHD

3. Consider the role of herbs, and other CAM therapies in the approach to ADHD.
Case

You are referred an 11 year old boy for management of ADHD.
The child did not respond to Ritalin.
The mother reports that she stopped giving the Ritalin after two weeks, because she didn’t like the idea of “drugging him up.” Instead, she has been giving him ginseng and ginkgo. She doesn’t know if he’s any better, but “at least it’s natural”.
Attention Deficit Hyperactivity Disorder (ADHD)

- Core symptoms of:
  - **Hyperactivity/Impulsivity for at least 6 months (6 or more),**
  - **Inattention (6 or more)**
- Affecting home, school, social and self-concept
- Chronic condition
Differential Diagnosis

- Vision and hearing problems
- Chronic illness with itch; breathing impairment, e.g., sleep apnea; sleep problems
- Developmental or learning problems; language deficits
- Absence seizures
- Substance abuse; side effect of medications
- Other mood or anxiety disorder; psychotic disorder; adjustment disorder
- Stress
- FREQUENT CO-MORBIDITIES; fixing these can solve most of the problem
Epidemiology:

- Prevalence: 3-11%
- Etiology: multifactorial
  - Genetic – family history of ADHD, alcoholism, sociopathy, LD, mood and anxiety disorders
  - Medical (maternal smoking and alcohol use during pregnancy; head injury; seizures; CNS infection; OSAS), and
  - Environmental risks (lead, CO, Cd, TV) and protective factors (high IQ, supportive, structured family environment)
  - Cultural – much lower prevalence estimates in Europe and Japan than US
  - many unknowns

- Conners. Contemporary Pediatrics 2003
AAP TOOLKIT from NICHQ

(http://www.aap.org/moc/ADHD/)

- Symptom checklists for use by parents and teachers (Vanderbilt Scale and scoring)
- Guidance on selecting appropriate therapy
- Forms to acquire teacher reports
- Written management plans to strengthen family skills
- Strategies to help monitor the child
<table>
<thead>
<tr>
<th><strong>DIAGNOSIS</strong></th>
<th><strong>PARENT INFORMATION AND SUPPORT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>Parent Information and Support</td>
</tr>
<tr>
<td>NICHQ ADHD Primary Care Initial Evaluation Form</td>
<td>Understanding ADHD: Information for Parents about Attention-Deficit Hyperactivity Disorder</td>
</tr>
<tr>
<td>NICHQ Vanderbilt Assessment Scale - Parent Informant</td>
<td>Does My Child Have ADHD?</td>
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<tr>
<td>NICHQ Vanderbilt Assessment Scale - Teacher Informant</td>
<td>Evaluating Your Child for ADHD</td>
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<tr>
<td>NICHQ Vanderbilt Assessment Follow-up - Parent Informant</td>
<td>For Parents of Children with ADHD</td>
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<td>NICHQ Vanderbilt Assessment Follow-up - Teacher Informant</td>
<td>What Can I Do When My Child Has Problems With Sleep?</td>
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<td>Scoring Instructions for the NICHQ Vanderbilt Assessment Scales</td>
<td>Educational Rights for Children With ADHD</td>
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<td>Sample: NICHQ Vanderbilt Assessment Follow-up - Parent Informant</td>
<td>Homework Tips for Parents</td>
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<td>Cover Letter to Teachers</td>
<td>Working With Your Child's School</td>
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**RESOURCES**

- Resources
- ADHD Coding Fact Sheet for Primary Care Clinicians
- ADHD Encounter Form
Best management strategies from RCT: Multimodal Treatment

- Medication (use in childhood is actually linked to REDUCED risk of subsequent substance abuse in adulthood – Wilens TE. Pediatrics, 2003) PLUS

- Behavioral therapies

  MTA Cooperative Group. Arch Gen Psychiatry, 1999
Stimulant Structures

Nissen SE. *NEJM* 2006
Stimulant Medications for ADHD

• Stimulants
  – Short acting (Methylphenidate/Ritalin; dextroamphetamine/Dextrostat; dexmethylphenidate/Focalin)
  – Intermediate acting (Dextroamphetamine ER/Dexedrine Spansules; Mixed amphetamine salts/Adderall; Metadate; Ritalin SR)
  – Long-acting stimulants (Mixed amphetamine salts/ADDERALL; Concerta; Ritalin LA)

• Effective in 60% - 65% of patients
Newer stimulants

• Extended release amphetamine (Adderall XR): biphasic approach; immediate + 4 hours later

• Methylphenidate
  – Metadate – biphasic delivery with 30% immediate and 70% 3 hours later
  – Concerta- triphasic delivery over 10 -12 hours
2006 CONCERNS

- Who likes giving their child SPEED?
- 2.5 million US children take stimulants; 3 fold increase from 1990-1995
- 10% of 10 year old boys
- 1.5 million US adults take stimulants
- 10% of stimulant use in adults over 50 years old
- Long-term impact of tachycardia and hypertension (5 mm Hg increase in SBP)?
- Problems with chemically-related ephedra (ephedrine and pseudoephedrine); death of Baltimore Orioles pitcher, Steve Bechler; ephedra was 1% of herbal sales and 64% of reports of adverse effects
- 2005, FDA proposed ruling on phenylpropanolamine (decongestant and weight loss) ban it? 16X increased risk of stroke in women who take it
- Sudden deaths

Nissen SE. *NEJM*, 2006
Side effects of stimulant medications

- Decreased appetite
- Decreased weight gain/ weight loss/ growth suppression
- Headaches;
- Hypertension; tachycardia, arrhythmias
- Stomachaches
- Hallucinations/mania
- Increase in tics
Non Stimulant Medications for ADHD

- Atomoxetine (Strattera): a selective noradrenaline (NE) reuptake inhibitor
- Formal Observation of Concerta versus Strattera (FOCUS) study; MPH somewhat better in African American kids; Better than placebo; about equal to Ritalin in small RCT
- 0.5 mg/kg – 1.2 mg/kg day or 40 – 100 mg q am. DO NOT OPEN, SPRINKLE, OR CRUSH CAPSULES
- Side effects include hypertension, decreased appetite, weight loss, abdominal pain, nausea, vomiting, dizziness, sleepiness, fatigue; Do not use with MAOI
- 9/95 US FDA Warning: “Strattera increases the risk of suicidal thinking in children and adolescents with ADHD. Pediatric patients being treated with Strattera should be closely observed for clinical worsening, as well as agitation, irritability, suicidal thinking or behaviors, and unusual changes in behavior, especially during the initial few months of a course of drug therapy, or at times of dose changes, either increases or decreases. This monitoring should include daily observation by families and caregivers and frequent contact with the physician.”

Kelsey. Pediatrics, 2004
Standard Behavioral Approaches

• Psychologist for 8 - 12 weeks; Specific CBT, goal oriented behavior changes in child AND family
• School intervention through IEP
CAM is common in ADHD

- 69% of Australian kids use stimulant meds
- 64% of Australian kids have used CAM
- 93% of American pediatricians report that parents ask about CAM therapies for ADHD -- avoiding sugar, food additives, vitamins, visual training
- CHADD Web site discussions about diet, additives, vitamins, etc.

Stubberfield, 1999
ADHD patient survey

- 69% families using stimulant meds
- 64% using or had used non-prescription therapy
  - diet most often

Stubberfield TG. *J Paediatr Child Health*, 10/99
AAP-ACQUIP 1998 ADHD survey

• 996/2154 responded
• 92% said patients asked about CAM; 38% patients using CAM
• 76% diet changes; 48% food additives
• 45% vitamins; 42% stop preservatives
• 27% visual training; 24% vitamins
• 21% plant extracts
Boston ADHD Survey

- 114 families referred to eval ADHD
- 73% male; 80% Caucasian; 56% met criteria ADHD; 62% had co-morbidity
- 51% taking stimulant meds; 57% reported side effects
- 54% parents used CAM for child in past year (39% expressive art; 39% vitamins and dietary supplements; 26% dietary changes) NATURAL; CONTROL
- 11% had talked with MD about CAM use

Chan E, J Dev Behav Pediatr. 2003
What would parents recommend to other parents of a child with ADHD?

- 24 would recommend CAM (music, diet, SI, exercise)
- only 8 would recommend stimulant medications
What would parents recommend that other parents of a child with ADHD AVOID?

– 7 warned about stimulant medications
– 7 warned about “unproved” therapies such as algae, magnets, etc.
Response to Ritalin

• Both clinical and healthy populations respond to stimulant medications with improved sustained attention

• Only 60% - 70% of patients with ADHD respond to stimulant medications
THE ELEMENTARY-SCHOOL LUNCHROOM
updated

TRADE YOU SOME CHEETOS AND A RITALIN FOR YOUR CUPCAKE AND A ZOLOFT.
ADHD: Parental concerns about meds; >50% report side effects

- Psychoactive medication - stigma
- Duration - interminable?
- Addiction?
- Side effects such as weight loss and insomnia
- Myths - “drugged out”; lethargic
Integrative Approach

- Lifestyle
- Biochemical
- Biomechanical
- Bioenergetic
Lifestyle

- Sleep more
- Exercise; structure/supervision
- Mind-Body Therapies
  - Special Time
  - EEG biofeedback
- Environment; less TV (Christakis, *Pediatrics*, 2004)
- Nutrition (low glycemic index?)
Sleep

- Regular time; Routine
- Hot bath; cool room; dark room
- Massage
- Lavender, chamomile, melatonin?
- Music
- NO TV IN BEDROOM
- NO vigorous exercise right before bed
- GET MORE!
Special Time

• 15 minutes daily of direct parent-child play;
• Child picks game or dance or singing or sports or biking or running
• NOT teaching, NOT chores, NOT homework
• Regardless of previous misbehavior
• Positive, fun attention time
• Repay attention deficit!
Biofeedback

• EEG biofeedback has positive effects in OPEN TRIALS
• Weekly training sessions of 30 -40 minutes one on one with psychologist
• Typically 30 -50 sessions
• fMRI does show changes with training
• Controlled trial found no benefit over placebo feedback (Heywood. *J Attention Disorders*, 2003)
Exercise


- Therapeutic Eurythmy – movement therapy developed by Rudolph Steiner; positive case reports

- TaeKwonDo; Karate; TaiChi
Diet

• Sugar
• Additives/preservatives/salicylates
• Glycemic index; sugar rush, followed by crash
• Coffee and cocoa?
Biochemical

- Medications
- Dietary Supplements, such as herbs; used by 20% of parents seen in 5 Tx community mental health clinics (ginkgo, SJW)

Cala S. *Pharmacotherapy*, 2003
ADHD: Common herbal remedies

• *Sedation* (for *sleep* problems and hyperactivity)
  – chamomile, skullcap, melatonin, valerian, etc.
• *Enhance brain activity/memory* -- ginkgo
• *Antioxidants* - good for grown-up brains
  – pycnogenol; grape seed extract
• *Energy-boosters* – ginseng, coffee/tea/mate'
• *Anxiolytics* -- kava kava
• *Antidepressants* - SJW, SAMe
Other dietary supplements

• Melatonin
• Fish Oil
• Iron, Zinc, Magnesium
Iron?

- Iron deficiency: celiac disease, too much milk, infection, GI losses, poor intake, lead
- 53 children with ADHD had avg ferritin of 23 versus 44 in normal controls of same age (P<0.004); high inverse correlation between ferritin and Connors scores.

Konofal. *APAM*, 2004

- Case report of 3 year old with very high Connors scores and low ferritin; treated for three months with iron. Improved ferritin and markedly improved behavior.

Zinc?

- 48 Ohio boys with diagnosed ADHD, “zinc correlated at r -0.45 (p = 0.004) with parent-teacher-rated inattention, even after controlling for gender, age, income, and diagnostic subtype”
  
  Arnold LE. J Child Adolesc Psychopharm, 2005

- Turkish RCT study of 400 children with ADHD: zinc sulfate 150 mg/day vs. placebo
  - 29% zinc treatment vs. 20% placebo treatment had full improvement (P<0.05) mostly for impulsive behavior and socialization;
  - best response in older kids and those with low Zn levels and low EFA levels

  Bilici. Prog Neuropsychopharm Biol Psychiatr, 2004
Magnesium?

- French study evaluated magnesium and B6 in 52 ADHD kids and relatives
  - 30 / 52 hyperactive children had low ERC-Mg values
  - Open label supplementation with 100 mg daily of Mg and B6 for 3-24 weeks
  - “In all patients, symptoms of hyperexcitability (physical aggressivity, instability, scholar attention, hypertony, spasm, myoclony) were reduced after 1 to 6 months treatment. Other family members shared similar symptoms, had low ERC-Mg values, and also responded clinically to increased Mg(2+)/vitamin B6 intakes. “

  **Mousain-Bosc M**, *Am J Clin Nutr*, 2004
Flax oil and vitamin C supplements improve ADHD

- 30 kids with ADHD, compared with 30 normal kids in clinic in India
- Supplement with 200 mg ALA + 25 mg Vitamin C twice a day, for 3 months
- All kids had more EFA in RBC cell membranes after 3 months
- ADHD kids had (P<0.01) improvements in total hyperactivity score, self-control, psychosomatic, restlessness, inattention, impulsivity, social problems, learning problems
- Need placebo controlled study!

Joshi K. Prostaglandins Leukot Essent Fatty Acids. 2006
Essential fatty acid DS for ADHD

- 41 kids, RCT to EPA 186 mg + DHA 480 mg + GLA 96 mg + cis-linoleic acid 864 vs. placebo mg daily for 12 weeks; EFA lowered Conners scores. 
  Richardson. 2002.

- Oxford-Durham RCT of fatty acids suppl’s for 117 children with developmental coordination disorder: “significant improvements for active treatment vs placebo were found in reading, spelling, and behavior over 3 months of treatment in parallel groups. After the crossover, similar changes were seen in the placebo-active group.”
  Richardson. Pediatrics, 2005
Melatonin in ADHD

- RCT in 25 children with ADHD and chronic sleep onset insomnia; melatonin 5 mg daily at 6pm vs. placebo
- Melatonin significantly improved sleep onset; decreased sleep latency and increased total sleep time
- No change in ADHD behavior over 4 weeks, but all kids kept using it for one year

Herbal and DS Sedatives

- Chamomile (Sleepy Time tea); Lemon balm; skullcap
- Melatonin - improves sleep for ADHD kids, but ? impact on daytime behavior
- Valerian - improves sleep onset, GRAS; interactions?
American ginseng and Ginkgo for ADHD

- Open trial among 36 children, 3-17 yo
- *Panax quinquefolium* (200 mg) + *Ginkgo biloba* (50 mg) BID X 4 weeks
- Connors parents scale
  - 2 weeks: 31% improved on anxious/shy; 67% improved on psychosomatic
  - 4 weeks: 74% improved on Conners’ ADHD Index

Cognitive function and other

• Evening primrose oil (omega 6 fatty acids)
  – 2 RCT’s - mild, inconsistent benefits for ADHD

• Fish oil (omega 3 fatty acids)
  – anti-inflammatory; infant neurodevelopment;

• Ginkgo - cerebral insufficiency; Germans use for ADHD

• Pycnogenol - anti-oxidant; venous insufficiency, dependent edema, night vision

• Blue green algae - (B vitamins and protein)
Herbal product variability

• Consumer reports examined 10 *ginseng* products; ginsenosides varied from 0.4 - 23.2 mg per capsule
• NO CORRELATION of concentration with label
• 2 products both listed 648 mg ginseng, but one contained 10 times as much as the other
• Similar findings in studies by LA Times and Boston Globe. Products contained 20% - 140% of label
• Only 1/10 SJW products contained 90% -110% of labeled amount of hypericin
• Similar findings with ephedra and other herbs
Herb- drug interactions: Saint Johns wort

Speeds elimination of many drugs, eg. digitalis, theophylline, clarithromycin, erythromycin, protease inhibitors and OCPs
Spirulina: Is it super blue-green algae or is it pond scum?
Biomechanical

• Surgery - NO

• Massage
  – Improves mood and behavior of 30 teenagers with ADHD in RCT; 20 minutes twice weekly
    Hernandez-Rief, 2003
  – Improves classroom behavior and happiness of 28 teenagers with ADHD in RCT of 20 minutes daily for two weeks
    Field, 1998

• Cranial, spinal or joint adjustment - No
## Massage Effects

<table>
<thead>
<tr>
<th>Attention</th>
<th>Attentiveness</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autism</td>
<td>Less off-task behavior</td>
<td>Less distractable \ Better social-relatedness</td>
</tr>
<tr>
<td>Attention deficit disorder</td>
<td>Stayed on-task longer</td>
<td>Less fidgeting \ Less hyperactivity</td>
</tr>
</tbody>
</table>

### Depression and anxiety

<table>
<thead>
<tr>
<th></th>
<th>Anxiety</th>
<th>Depression</th>
<th>Stress hormones</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttraumatic stress disorder</td>
<td>Less</td>
<td>Less</td>
<td></td>
<td>Higher self-esteem \ Drawings showed less psychologic distress \ Fewer classroom behavior problems</td>
</tr>
<tr>
<td>Hospitalized psychiatric patients</td>
<td>Less</td>
<td>Less</td>
<td>Lower cortisol \ Lower norepinephrine</td>
<td>More sleep \ Less disturbed behavior</td>
</tr>
<tr>
<td>Bulimia</td>
<td>Less</td>
<td>Less</td>
<td>Lower cortisol</td>
<td>Improved body image</td>
</tr>
</tbody>
</table>
Bioenergetic

- Acupuncture
- Healing Touch/TT/Reiki/Qi Gung
- Prayer/Spirituality
- Homeopathy – negative trials of homeopathy and Bach flower remedies
- NONE PROVEN WITH ADHD
You must be as tall as this sign to attack the city.
ADHD SUMMARY

Talk with families and negotiate plan with clear outcomes.
Best data are still for stimulant medications; side effects and lack of control may drive families to CAM.
Correct any underlying or comorbid conditions
Improve sleep – consider chamomile, lavender, lemon balm
Exercise – structured, supervised, TOGETHER time; protective gear for biking, contact sports
Optimize nutrition (low glycemic index, nutritious foods). Consider MV, minerals and omega three fatty acids? melatonin.; consider stimulant beverages (coffee/tea)
Exercise; Massage
TV out of bedroom
ASK! GIVE SUPPORT and HOPE, be PRACTICAL
Review articles:

- ***AAP. MOC. ADHD Info ***
- [http://www.holistickids.org/teaching_toolbox/adhd.html](http://www.holistickids.org/teaching_toolbox/adhd.html)
Inattention (6 or more)

- Often fails to give close attention to details/careless mistakes
- Often has difficulty sustaining attention in tasks or play
- Often does not seem to listen when spoken to directly
- Often does not seem to follow through on directions and finish work, chores
- Often has difficulty organizing tasks/activities
- Often avoids, dislikes or reluctant to engage in tasks requiring sustained mental effort
- Often loses things necessary for tasks or activities
- Often easily distracted by extraneous stimuli
- Often forgetful in daily activities

6 or more of above
Hyperactivity/Impulsivity for at least 6 months (6 or more)

- Often squirms or fidgets with hands or feet
- Often leaves seat in classroom or other situations where sitting is expected
- Often runs or climbs excessively in inappropriate situations
- Often has difficulty playing quietly
- Often “on the go” or acts as if “driven by a motor”
- Often blurts out answers before questions have been completed
- Often has difficulty awaiting turn
- Often interrupts of intrudes on others
Vanderbilt:  

## Vanderbilt ADHD Diagnostic Teacher Rating Scale

<table>
<thead>
<tr>
<th>Frequency Code: 9 = Never; 1 = Occasionally; 2 = Often; 3 = Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fails to give attention to details or makes careless mistakes in schoolwork</td>
</tr>
<tr>
<td>2. Has difficulty sustaining attention to tasks or activities</td>
</tr>
<tr>
<td>3. Does not seem to listen when spoken to directly</td>
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<tr>
<td>4. Does not follow through on instruction and fails to finish schoolwork (not due to oppositional behavior or failure to understand)</td>
</tr>
<tr>
<td>5. Has difficulty organizing tasks and activities</td>
</tr>
<tr>
<td>6. Avoids, dislikes, or is reluctant to engage in tasks that require sustaining mental effort</td>
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<tr>
<td>7. Loses things necessary for tasks or activities (school assignments, pencils, or books)</td>
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<tr>
<td>8. Is easily distracted by extraneous stimuli</td>
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<tr>
<td>9. Is forgetful in daily activities</td>
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<tr>
<td>10. Fidgets with hands or feet or squirms in seat</td>
</tr>
<tr>
<td>11. Leaves seat in classroom or in other situations in which remaining seated is expected</td>
</tr>
<tr>
<td>12. Runs about or climbs excessively in situations in which remaining seated is expected</td>
</tr>
<tr>
<td>13. Has difficulty playing or engaging in leisure activities quietly</td>
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