AD/HD in Sports

- Introduction
- Definition
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- Effects on exercise
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- Medications and effect on exercise
- Regulatory Issues
- Conclusions

Introduction

A behavior disorder characterized by chronic and impairing behavior patterns that result in abnormal levels of inattention, hyperactivity, or combination of both.

A clinical diagnosis: no lab, x-ray or physical findings!

DSM - IV Criteria: Inattention

- 6 of the following symptoms of inattention that have been present for at least 6 months to a degree that is maladaptive
  a) Often fails to give close attention to details or makes careless mistakes
  b) Has difficulty sustaining attention in tasks or play
  c) Does not seem to listen when spoken to
  d) Does not follow through on instructions and fails to finish schoolwork, chores or duties
  e) Has difficulty organizing tasks
  f) Avoids tasks that require sustained mental effort
  g) Looses things necessary for tasks or activities
  h) Easily distracted by extraneous stimuli
  i) Forgetful in daily activities

DSM - IV Criteria: Hyperactivity/Impulsivity

- 6 of the following symptoms of hyperactivity-impulsivity persisting for 6 months that are maladaptive
  a) Fidgets with hands or feet or squirms in seat
  b) Leaves seat in situations where seating is mandated
  c) Runs about or climbs excessively in inappropriate situations
  d) Difficulty playing quietly
  e) Is often “on the go” or “driven by a motor”
  f) Talks excessively
  g) Blurs out answers before question is finished
  h) Difficulty awaiting turn
  i) Interrupts or intrudes
**DSM – IV Criteria  Impairment**

- Some symptoms of inattention or hyperactivity that caused impairment were present before age 7
- Some impairment from the symptoms is present in 2 or more settings
- Must be clear evidence of clinically significant impairment social, academic, or occupational function
- Symptoms not better accounted for from another mental disorder

**Epidemiology**

- Affects 4-10% of all children
- 65-85% of ADHD children meet DSM-IV criteria as teenagers and young adults
- Would expect same numbers in athletes, however some athletes take advantage of subjective nature of diagnosis in order to get put on stimulants to aid in their performance.
- Full Neuropsychological testing, not self-reported scales or checklists, is used at the University in order to assure diagnosis

**Effects on Exercise**

- Impaired locomotor skills
- Lower cardiovascular fitness (non-athletes)
- Poor attention span
- Difficulty initiating or completing tasks in boring activities
- Too much attention to novel situations
- Difficulty waiting one’s turn
- Increased risk-taking behavior

**Effects on Exercise**

- Inability to manage own time
- Difficulties with unstructured time
- Lack of organizational skills
- Common co-morbidities: Anxiety, depression, disruptive behavior, learning disorders, substance abuse, psychotic disorders

**Other Effects**

- Difficulty in Neuropsychological testing after concussion
- Dangerous driving
- Academic underachievement
- Impaired peer relationships
- Delinquent behavior
- Impulsive sexual activity
- Increased risk of drug abuse

**Advantages of ADHD in Sport**

- Impulsivity- spontaneous and quick decision making
- Hyper focus on enjoyable activity- Fascination and reward centers of brain
- Fewer anxiety and depression symptoms in children participating in at least 3 sports
Treatment
• Behavioral Treatment
• Psychological Treatment
• Medication
• Treatment Team:
  - Psychologist
  - Psychiatrist
  - Team Physician
  - Academic Advisor
  - Parents
  - Coaches
  - Athletic trainers

Behavioral Treatment
• Less effective than medications alone
• Best if there is a structured environment providing consistent positive rewards for well-defined behaviors
• Includes:
  - Parent Training
  - Family Therapy
  - Organizational-Skills Training
  - Individual Tutoring
  - Social-Skills Training
  - Individual Psychotherapy

Psychological Treatment
• More important when there are coexisting psychopathologies:
  - Anxiety/Depression
  - Oppositional Defiant Disorder
  - Conduct Disorder
  - Bipolar Disorder
  - Adjustment Disorder
  - Learning Disorder

Medications
• 56% of patients with ADHD on medications
• Most are stimulants
• Stimulants are helpful in 75%
• Use of stimulants has doubled every 4-7 years²
• Use in Major League Baseball (according to medical exception applications) rose from 26 in 2006 to 103 in 2007 and 108 in 2009 (9% of total of 1200 major league players)⁸

Stimulants
• Methylphenidate (Ritalin, Concerta)
• Mixed dextroamphetamine-amphetamine salts (Adderall)
• Dextroamphetamine (Dexadrine)
• Modafinil (Provigil)

Non-Stimulants
• Atomoxetine (Strattera)
• Bupropion (Wellbutrin)
• TCAs
• Clonidine (Catapres)
• MAO inhibitors
• SSRIs (Prozac, Zoloft)
• Guanfacine (Intuniv)

Adverse Effects of Stimulants
• Decreased appetite
• Weight loss
• Insomnia
• Abdominal pain
• Tearfulness
• Headaches
• Tics
• Tourette’s Syndrome
### Adverse Effects on Athletes
- Increase core temperature
- Mask signs and symptoms of fatigue
- Increase risk of heat illness
- Decreased appetite and weight gain
- Growth retardation - 1cm/year (no reduction of adult height)
- Decrease aggression
- Cardiovascular effects

### Cardiovascular Effects
- Elevation of resting heart rate: 11 beats/min (only 4 beats/min after prolonged use)
- No effects on blood pressure
- No ECG changes
- No serious adverse cardiac events in 1.2 million children (age 2-24) over 2 years

Cooper et al NEJM 365(20) 2011

### Contraindications for Stimulant Use
- Hypertension
- Glaucoma
- Hyperthyroidism
- Symptomatic Cardiovascular Disease
- Structural Heart Disease
- Hypersensitivity to drugs
- MAO inhibitor or St. John’s Wort use
- Drug Dependence
- Psychosis

### Abuse/Misuse
- Always a concern when a therapeutic drug is considered a “street drug”
- 2006: 4% college students admitted using Ritalin at least once
- Johnson et al; National Institute of Drug Abuse: 2007
- 2008: 5.3% of college students admitted non-medical use stimulants
  - DuPont et al; Am J Addictions 2006;17:167-171
- 2008: 34% of students from a SE university reported use of a stimulant for stress relief, reduction of fatigue and increased cognition and memory
- 6.3% NCAA athletes use stimulants without a prescription
  - Hendrickson, B. Non-Medical use of ADHD meds examined in Convention session. NCAA.org

### Potential Medication Benefits to Athletes
- Improve fine motor coordination
- Improve balance
- Improve attention and concentration
- Mask fatigue
- Weight control
- Sense of euphoria
- Decreased pain
Use of Stimulants in Competition

- Methylphenidate is metabolized rapidly and is usually out of system in 24 hours.
- Dextroamphetamine has longer and less predictable duration of action: should stop 4-5 days prior to competition.
- Since banned, any level of detection is a “positive” so careful when deciding when to cease medication.

Regulatory Issues

- Banned by WADA: during competition, no TUE (therapeutic use exemption).
- Banned by IOC: no TUE.
- Banned by NCAA: (NCAA Bylaw 31.2.3): TUE.
- NCAA requires athletes taking stimulants to provide “evidence that the student athlete has undergone clinical assessment to diagnose the disorder, is being monitored routinely for use of the stimulant medication and has a current prescription on file” (NCAA 8/2009).

Regulatory Issues

- Athletes diagnosed in childhood must provide their institution with copies of formal comprehensive assessment and history of treatment.
- If no formal assessment available, then one must be performed at the institution.
- NCAA requires annual evaluation and reporting to medical staff and documentation of follow-up.

NCAA Requirements for Medical Exception Documentation 2012-2013

- Diagnosis
- Medication(s) and dosage
- Blood Pressure and Pulse readings
- Documentation of consideration of alternative non-banned substances
- Follow-up orders
- Documentation of written report summary of comprehensive clinical evaluation: ADHD rating scales.

NCAA Form

AMSSM Forms
Conclusions

• ADHD is prevalent in athletes
• If untreated, ADHD affects athletic performance in numerous ways
• Treatment should be multimodal
• Medications may improve attention, concentration and fine motor coordination but this may be offset by decreased aggression
• There appears to be little cardiovascular risk with the use of these drugs, but possible heat related issues

Other Therapies

• Diets: low sugar, dye-free
• Neurofeedback
• Chelation Therapy
• Systemic Antifungal Therapy
• Vitamins

Conclusions

• Participation in sports is good for children with ADHD
• Stimulant medications are currently banned by governing bodies in sport during competition and documentation of diagnosis, options, and follow-up must be performed

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