ADHD:

Initial Diagnosis of Children and Teenagers

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Attention deficit/hyperactivity disorder (ADHD) is the most common neurobehavioural disorder in childhood. It affects 6% to 8% of school-aged children and 6% of teens so you are likely to see it in practice. This review presents a practical approach to the diagnosis of ADHD using guidelines and a toolkit developed for primary care providers by the American Academy of Pediatrics. You will learn to use Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)-based questionnaires to save time in history taking while still being thorough enough to diagnose accurately and avoid missing comorbidity. The toolkit also helps you manage medication trials and monitor side-effects.

Criteria for ADHD are set out in the DSM-IV fourth edition (Table 1). A child meets DSM-IV criteria if he or she has six or more of nine symptoms of inattention ("ADHD, Primarily Inattentive Type"), hyperactivity/impulsivity ("ADHD, Primarily Hyperactive/Impulsive Type"), or both ("ADHD, Combined Type"). Although typically developing children may at times meet some DSM-IV criteria, what distinguishes ADHD from normal behaviour is its severity, duration and pervasiveness.

Symptoms must start before seven-years-of-age and must significantly interfere with function in two or more settings (*e.g.*, home and school). Symptoms do not occur exclusively during the course of an Autism Spectrum Disorder or a psychotic disorder such as schizophrenia and are not better accounted for by another mental disorder such as mood, anxiety or personality disorder.

Meet Mackenzie

Mackenzie, a 7-year-old boy, was just suspended because of aggression. The school wants him checked for Attention deficit/hyperactivity disorder (ADHD). His Grade 2 teacher's note says that Mackenzie is inattentive and does not finish task reminders. He is very fidgety and has trouble sitting. Yesterday he pushed a girl off a swing which then struck her head and caused a bump. This was not the first incident and the teacher is worried that the next time will be more serious. His mother feels Mackenzie is "just a boy" and is worried that the school wants him put on "drugs." You have taken care of Mackenzie since he was born. Except for a few ear infections he has been very healthy. He certainly is busy in your office but does he have ADHD? How can you make an accurate diagnosis in your office? Or should he see a specialist?

Turn to page 16 for more on Mackenzie.

Prevalence

Boys are more commonly affected than girls (approximately 2.5:1). Previous higher ratios are thought due to referral bias—more boys are

Table 1

Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) symptoms of ADHD

DSM-IV: 6 of 9 symptoms of inattention

- Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
- Often has difficulty sustaining attention in tasks or play activities
- Often does not seem to listen when spoken to directly
- Often does not follow through on instructions and fails to finish schoolwork, chores, or other duties in the workplace
- Often has difficulty organizing tasks and activities
- Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
- Often loses things necessary for tasks or activities (*e.g.*, toys, pencils)
- Is often easily distracted by extraneous stimuli
- Is often forgetful in daily activities

DSM-IV: 6 of 9 symptoms of hyperactivity/impulsivity

- Often fidgets with hands or feet or squirms in seat
- Often leaves seat in classroom or in other situations in which remaining seated is expected
- Often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
- Often has difficulty playing or engaging in leisure activities quietly
- Is often "on the go" or often acts as if "driven by a motor"
- Often talks excessively
- Often blurts out answers before questions have been completed
- Often has difficulty waiting their turn
- Often interrupts or intrudes on others (*e.g.*, butts into conversations or games)

Table 2

ADHD comorbidity and differential

ADHD and something else: comorbidities

ADHD is causing the symptoms, but comorbid conditions may make them worse and affect choice of treatment

"Psychiatric" (*i.e.*, DSM diagnoses)

- "Simple ADHD" only (31%)
- ADHD with oppositional defiant disorder (40%)
- With conduct disorder (14%)
- With tics (11%)
- With anxiety disorder (34%)
- Mood disorders and smoking about same prevalence as conduct disorder, substance abuse disorders a little less

Developmental

- Speech and language delays
- Language-based learning disability, including developmental dyslexia
- Non-verbal learning disability
- Developmental coordination disorder/motor delays

ADHD or something else: differential

"Something else" is causing the symptoms so that the presentation looks like ADHD but when you treat the something else, the symptoms disappear. Includes all the above plus:

- Neurological disorders, (*e.g.*, *petit mal* epilepsy)
- Sleep disorders, (*e.g.*, obstructive sleep apnea [OSA])
- Sensory impairments: vision, hearing
- Medical conditions causing fatigue, pain
- Syndromes with mental retardation—inattention due to poor understanding
- Psychosocial issues: divorce, separation, parental death, abuse issues

Sometimes even these co-occur with ADHD—treat first and see what residual issues remain

referred because they have more comorbid disruptive disorders (*e.g.*, oppositional defiant disorder). Girls may present as chatty "social butterflies" or inattentive daydreamers. Because girls' symptoms may be less noticeable, diagnosis may be delayed. In adults with residual ADHD (about 4% of the general population), the ratio is approximately 1:1.

Etiology

The symptom triad of inattention, hyperactivity and impulsivity appears to reflect a final common pathway for several factors affecting the prefrontal cortex. Neuroanatomic/neurochemical differences, genetics, environmental influences and central nervous system insults are all associated with ADHD symptoms. Patients with ADHD have been shown to have decreased metabolic activity in frontal and prefrontal areas that

improves with stimulant therapy. There is a 25% risk of finding ADHD in first-degree relatives, 11% to 44% of children with ADHD have a parent with ADHD and siblings are three to four times more likely to have ADHD than the general population. ADHD has about the heritability as height; in other words, it is as common to find that a tall child with tall parents or siblings as it is to find that a child with ADHD who has a parent or sibling with ADHD.

Initial clinical approach

Like most developmental/behavioural conditions, ADHD has a broad differential and frequent comorbidity (Table 2) which can make assessment seem daunting. It is the primary care physician's job to:

1. Narrow the differential: many conditions can only be ruled out by physicians
2. Identify comorbidities: not doing so is often the reason for med failures
3. Treat the easy stuff: one-third of ADHD is uncomplicated and can be treated in primary care settings
4. Refer: if a complicated presentation or if ongoing problems despite treatment

The work-up for ADHD is similar to that for any developmental condition and includes thorough exploration of the chief complaint. Use the same kinds of questions you use for a headache (When did the problem start? What makes it better or worse? What have you tried so far? Whom else have you consulted? *etc)*. Behavioural history should come from at least two sources (*e.g.,* home and school). Educational history includes testing done by the school. Individual IQ and academic achievement testing would be optimal but sometimes report cards and group testing (*e.g.*, provincial achievement scores) must suffice. Also include birth history, medical review of systems, developmental history by sector and family and psychosocial history (Table 3). As you already know these families, review your old records to save time.

Table 3

Medical history for ADHD

Chief complaint

- Behavioural information from at least two sources
- Educational history (get school records)

Birth history

- Prenatal
  - Pregnancy planned or "a surprise"
  - Smoking, alcohol, drugs (including prescriptions)
  - Maternal health during pregnancy
- Labour and delivery
  - Gestational age, birth weight
  - Asphyxia (Apgars may be a clue)
  - Neonatal complications

Medical illnesses

- Overall health
- Injuries, especially head trauma
- Neurologic conditions
- Vision and hearing
- Growth and nutrition
- Elimination
- Sleep

Developmental history (by sector)

- Gross motor
- Fine motor (including activities of daily living)
- Speech and language
- Cognitive (including academic achievement)
- Social-emotional (including family relationships and friendships)

Family and psychosocial history

- Caregivers (biological, step, adoptive, foster): age, health, education, employment
- Siblings (age, health, developmental status)
- Anyone else live in the home?
- Family stressors (physical and mental health of caregivers, financial issues)
- Supports and services being received
- Conditions that run in the family

Using DSM-IV-based behaviour questionnaires also saves time. These can be given to parents and teachers to fill out prior to appointments. They take only a few minutes and no specialized training to score. The two most popular are the Swanson, Nolan and Pelham (SNAP) Teacher and Parent Rating Scale and the National Initiative for Children's Healthcare Quality (NICHQ)

Table 4

Physical exam for ADHD

Growth parameters

- Height, weight, BMI, head circumference

Vital signs

- BP, pulse (baseline)

Vision and hearing

General exam

- Head and neck
  - Eyes and ears, airway
  - Dysmorphic features (fetal alcohol spectrum disorder, other syndromes)
- Chest and abdomen: signs of chronic illness
- Cardiac: check for CV risk factors and establish baseline
- Musculoskeletal: minor anomalies
- Genitourinary: Tanner stage

Neurological exam

- Cranial nerves
- Deep tendon reflexes, clonus, rigidity, Babinski's
- Motor strength and tone, asymmetry
- Gross sensation
- Cerebellar signs: finger-nose and heel-shin maneuvers, Rhomberg
- "Soft signs"
- Gait and stressed gaits

Vanderbilt Assessment Scales, Parent and Teacher Informant versions. Both are free to download and include DSM-IV criteria for ADHD and many of its comorbidities formatted as a Likert-type scale with symptoms rated from zero to three where a two or three rating would meet that DSM criterion. NICHQ Vanderbilt forms are part of the complete ADHD management toolkit developed by NICHQ and the American Academy of Pediatrics for primary care use. There are also Parent and Teacher Follow-up forms for monitoring effects of interventions on symptoms and a side-effect rating scale. The toolkit includes scoring information and parent handouts on topics like sleep and homework. The work-up for ADHD also requires a complete and up-to-date physical exam (Table 4). This, along with medical history and behavioural questionnaires, will ensure an accurate ADHD diagnosis.

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Take-home message

- Accurate ADHD diagnosis requires a careful history and physical exam because of the broad differential and frequent comorbidity seen in this condition
- DSM-IV-based behaviour questionnaires help to diagnose ADHD quickly and accurately

Mackenzie's case cont'd

Mackenzie's parent Vanderbilt forms showed endorsement of 7 of 9 symptoms of inattention and 6 of 9 symptoms of hyperactivity/ impulsivity, while the teacher Vanderbilt forms showed endorsement of 6 of 9 symptoms of inattention and 8 of 9 symptoms of hyperactivity/impulsivity. Because he had ≥ 6 symptoms in each cluster that were scored at 2 or 3 in severity, Mackenzie met DSM-IV criteria for ADHD, Combined Type.

Resources

1. Diagnostic and Statistical Manual of Mental Disorders. Fourth Edition. American Psychiatric Association, New York, 1994. p.78-85.
2. The SNAP-IV Teacher and Parent Rating Scale (Swanson, JM). http://www.adhd.net/snap-iv-form.pdf. Accessed July 7 2009.
3. National Initiative for Children's Healthcare Quality (NICHQ): http://www.nichq.org/ Accessed July 7 2009.
4. UpToDate Editorial Team. Krull KR (author) Attention Deficit Hyperactivity Disorder In Children and Adolescents: Clinical Features and Evaluation AND Epidemiology and Pathogenesis. www.uptodate.com. Accessed May 21, 2009 .
5. American Academy of Pediatrics, Committee on Quality Improvement and Subcommittee on Attention Deficit/Hyperactivity Disorder. Clinical Practice Guideline: Diagnosis and Evaluation Of The Child With Attention Deficit/Hyperactivity Disorder. Pediatrics 2000; 105(5):1158-70.