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Attention Deficit-Hyperactivity Disorder (ADHD) in Children/Youth: Information for Primary Care

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Summary: Attention deficit hyperactivity disorder (ADHD) is a common condition occurring in 5% of children/adolescents, and is a significant contributor to mood and behaviour problems. Early identification and management makes a significant impact, with interventions such as: 1) medications; 2) school accommodations and modifications; 3) education and strategies for ADHD.

Case, Part 1

D. is a 7-yo male that you are seeing for a yearly checkup. As you ask about things at home, mother reports that he is an extremely active, spirited child, and it is extremely frustrating at home. He has troubles listening, and parents have to repeat themselves over and over. You ask about things at school, and she tells you, “He’s been having problems at school this year too.” Parents are exhausted… “Why can't he just be like his younger brother who listens and obeys?"

Epidemiology

Prevalence ~ 5% of children/adolescents.
Gender: Males > females

Clinical Presentation

Child/youth who presents with

- School or academic problems
- Behavioral problems such as oppositionality, defiance, aggression, social/emotional “immaturity”)
- Inattention / distractibility such as problems paying attention at home/school
- Hyperactivity such as troubles sitting still in class
- Impulsivity such as problems doing things without thinking through the consequences

Interviewing Questions for ADHD Symptoms

Is it a younger child? Direct most question to parents.
Is it an older child or teenager? Direct most questions to the teenager, while maintaining eye contact with parents to see if parents have different opinion.

Inattention	For parents • Any problems paying attention? • Do you have to repeat things over and over again? • At school, have teachers been concerned? • Any problems staying focused on boring activities such as schoolwork? (Note: Being able to focus on computers and video games doesn’t count because they are so highly stimulating that even a person with ADHD can usually focus on them) • Does your child have any troubles finishing what s/he starts? For child/youth • Do you find it hard to pay attention? • Do you have any problems finishing things that you start?
Hyperactivity	Parents • Is your child hyper? Does your child fidget with his/her hands or feet? Have teachers ever complained that your child can't sit still in class? Child/Youth • Do you have troubles sitting still? For example, at home at the dinner table? At your desk in school?
Impulsivity	For parents • Does your child tend to act before thinking through the consequences? Child/youth • Do you find that sometimes, you just get a thought in your head, and you just act on it before thinking about it?
High need for stimulation	For parents • Does your child frequently complain of being bored? Does your child have troubles keeping himself occupied or stimulated? For child/youth • Do you get bored easily in class?
Disorganization	For parents: • Is your child messy or disorganized? Does your child tend to lose things? Does your child lose or forget assignments? For child/youth • Do you have troubles keeping your things at home or school tidy? Do you lose things? • At school, do you lose or forget assignments?

Rating Scales for ADHD

Diagnosis

Diagnosis is based on DSM-5 criteria with 3 types, depending on the types of symptoms present in last 6-months

ADHD, Combined	Inattention and hyperactivity-impulsivity
ADHD, Predominantly Inattentive	Inattention
ADHD, Predominantly Hyperactive-Impulsive	Hyperactivity-impulsivity were present

DSM-5 Criteria

A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development:

1. Inattention: Symptoms inappropriate for the developmental level present for at least 6 months, as manifested by:

≥ 6 symptoms of inattention for children up to age 16, or
≥ 5 or more for aged 17+

1. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or with other activities.
2. Often has trouble holding attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., loses focus, side-tracked).
5. Often has trouble organizing tasks and activities.
6. Often avoids, dislikes, or is reluctant to do tasks that require mental effort over a long period of time (such as schoolwork or homework).
7. Often loses things necessary for tasks and activities (e.g. school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
8. Is often easily distracted
9. Is often forgetful in daily activities.

2. Hyperactivity and Impulsivity: Symptoms inappropriate for the developmental level present for at least 6 months, as manifested by:

≥ SIX symptoms hyperactivity-impulsivity for children up to age 16,
≥ FIVE for aged 17+

1. Often fidgets with or taps hands or feet, or squirms in seat.
2. Often leaves seat in situations when remaining seated is expected.
3. Often runs about or climbs in situations where it is not appropriate (adolescents or adults may be limited to feeling restless).
4. Often unable to play or take part in leisure activities quietly.
5. Is often "on the go" acting as if "driven by a motor".
6. Often talks excessively.
7. Often blurts out an answer before a question has been completed.
8. Often has trouble waiting his/her turn.
9. Often interrupts or intrudes on others (e.g., butts into conversations or games)

In addition, the following conditions must be met:

- Symptoms present before age 12 years.
- Symptoms are present in two or more setting, (e.g., at home, school or work; with friends or relatives; in other activities).
- Symptoms interfere with, or reduce the quality of, social, school, or work functioning.
- Symptoms not better explained by another mental disorder (e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder), nor present only during psychotic episode.

Three Types of ADHD depending on the types of symptoms present in last 6-months

ADHD, Combined	Symptoms of both criteria inattention and hyperactivity-impulsivity were present
ADHD, Predominantly Inattentive	Sufficient symptoms of inattention were present

ADHD, Predominantly Hyperactive-Impulsive	Sufficient symptoms of hyperactivity-impulsivity were present

Because symptoms can change over time, the presentation may change over time as well.

DDx and Comorbid Conditions

Many conditions can cause symptoms such as inattention, thus mimicking ADHD.

- Addressing the underlying condition may result in elimination of ADHD symptoms, e.g. treating iron deficiency anemia may improve inattention.

Many conditions may be comorbid in addition to underlying ADHD

- Addressing any comorbid condition is important, such as anxiety disorder. Anxiety can worsen attention, and treating anxiety (e.g. psychotherapy or SSRI) can thus improve attention.

Conditions	**History / Screening questions**	**Investigations / Management**
Anxiety and depression	Any problems feeling anxious? Any problems with depression? Before the anxiety/depression, were there significant problems paying attention? Or did the significant problems with attention mainly start since the anxiety/depression?	If significant issues with anxiety/depression, consider referral to mental health professional.
Developmental conditions		
* Learning / language disorders	Does the school-aged child have much lower grades in a specific subject, compared to others? E.g. Passing most subjects, but is failing math (i.e. math disorder)	Psychoeducational assessment for school-aged children
* Intellectual disability	Young child: Problems in various developmental domains such as speech/language? Older child: Is the patient behind that of peers in all areas?	Developmental paediatrics consult Psychoeducational assessment for school-aged children
* Developmental coordination disorder	Fine motor problems? E.g. tying shoelaces, doing buttons/zippers, printing/writing? Gross motor problems? E.g. clumsy in general, troubles with learning to ride bike, throw a ball, do sports	Occupational therapy (OT) or physiotherapy (PT) consult
* Genetic conditions (e.g. Fragile X, fetal alcohol spectrum disorder)	Any dysmorphic facies? Any signs of intellectual disability?	Genetics consult
Neurological conditions		
* Tics or Tourette’s syndrome	Any involuntarily motor movements?	Neurology consult
* Seizure Disorder, such as absence seizures	Any periods of unresponsiveness?	Neurology consult
Sleep disorder		
* Restless legs	Any problems sleeping due restless legs? Are sensations worse at night? Are sensations relieved by movement?	Neurology consult

* Periodic limb movement disorder	Do spouses or others notice that the patient moves during the night? Problems staying asleep? Problems with excessive daytime sleepiness?	Neurology consult
Metabolic/Endocrine		
* Thyroid problems	Any problems with fatigue, weight changes, problems tolerating heat or cold?	Thyroid indices
* Anemia such as iron deficiency anemia	Any problems with low energy?	CBC to rule out anemia B12 / folate Iron
* Toxins (e.g. lead)	Does the patient live in an old home? Anyone in the family involved in occupations with lead exposure?	Serum lead (or other heavy metals) if concerns about lead or other heavy metal toxicity
Sensory issues		
* Visual	Any visual issues? E.g. troubles reading	Optometry / Opthalmology consult
* Visual stress	Any signs of visual stress, such as problems reading due to eye strain? Words moving on the page? Preference for dim lighting?	Optometry consult for visual stress, scotopic sensitivity (aka Irlen syndrome)
* Convergence insufficiency disorder	Diplopia makes it hard to see and read, which can make patient appear distractible / inattentive	Optometry / Opthalmology consult
* Auditory	Auditory processing issues, such as troubles understanding other people when it is noisy in the background, or if a lot of people? Getting overwhelmed when there is background noise?	Audiology consult for auditory processing issues
* Sensory processing issues	Are there troubles with processing sensory input, such as hypersensitivity to sound, touch or visual input?	Occupational therapy (OT) consult to help with sensory regulation and/or rule out sensory processing issues

Physical Exam (Px)

The physical exam in ADHD should be normal.

Baseline Vitals (BP, HR, RR)	In the event medications are started, baseline measures are important
Baseline height and weight	
General observations	Any hyperactivity - impulsivity? There may be walking around the room; pacing; climbing / jumping. Other patients may be able to sit still, but need to fidget with hands / legs, chewing on things. Any dysmorphic features that might suggest fetal alcohol, or genetic syndromes? (which may lead to ADHD symptoms) Excessively pale? Might suggest anemia?
Skin	Dry skin, eczema, brittle nails, may indicate possible omega 3 fatty deficiency, which may lead to ADHD symptoms

Thyroid	Any signs of hyper or hypothyroid? (which may imitate symptoms of ADHD)
Cardiovascular exam	Do a cardiovascular exam to establish baseline and to exclude cardiovascular conditions that might contraindicate potential stimulant medication treatment
Neurological exam	ADHD is due to functional changes (rather than structural) and thus the neurologic exam should not should any signs of structural issues

Investigations

There are no investigations that are diagnostic for ADHD, however investigations may play a role in helping rule out contributory or comorbid conditions.

Test	Rationale
CBC	To rule out anemia
Electrolytes	
Kidney / renal • Bun/Cr	Not absolutely necessary for ADHD workup. May be helpful for ruling out other medical contributors (e.g. diabetes that might affect renal function).
Liver enzymes	Not absolutely necessary for ADHD workup, however can be helpful for establishing a baseline in the event other medications (e.g. Risperidone) might be used later on.
Nutritional	
• Ferritin	Iron deficiency can lead to anemia
• B12 / folate	Low B12/folate can lead to all manner of similar symptoms.
• Magnesium	Low magnesium can cause fatigue, weakness, inattention, along with muscle twitches.
• Vitamin D	Low vitamin D can lead to inattention and fatigue.
Endocrine	
• Thyroid indices (TSH, free T4, e tc.)	Thyroid issues as hyper- or hypothyroidism can have similar symptoms to ADHD.
Toxicity	
• Serum lead	Classic reasons to order include living in substandard housing with lead paint, or poverty. Unfortunately, many schools have been shown to have elevated lead in drinking water.
Substance screening	
• Urine drug screen	New onset symptoms of inattention, impulsivity may be related to new onset recreational drug use.

Other tests

- Sleep studies: Are there concerns about a sleep disorder?
- Psychoeducational Testing for all children/youth with ADHD (recommended by CADDRA)
- Audiology assessment to rule out hearing problems
- Optometry assessment to rule out visual problems

Management

For preschool-aged children aged 4-5 years

- 1st line
  - Evidence-based parent and/or teacher-administered behavior (i.e. non medication) strategies
  - Examples include parent education, parent management training such as Triple P, Incredible Years
- 2nd line
  - Should those be ineffective, consider methylphenidate

For children/youth (age 6-18)

- 1st line
  - ADHD medication alone are more effective than behavior treatment alone (MTA Study)
  - Many parents prefer to start with non-medication interventions prior to initiating medication, thus:
  - Consider offering non-medication intervention first (e.g. school accommodations)
  - Ask parents if they would agree to re-consider medications at a later visit if ADHD symptoms persist

For all ages

- Education about ADHD
- Recommend self-help and advocacy organizations such as
  - ADHD Advocacy and Support Groups such as
  - Centre for ADHD Awareness, Canada (CADDAC) www.caddac.ca
- Local, Provincial or National Learning Disability Organizations such as
  - Learning Disabilities Association of Canada www.ldac-acta.ca

Medication Treatment

Step 1

- Start with one of the first-line medications (e.g. long acting methylphenidate) .

Step 2

- Are there problems with the first-line medication? Switch to a different class (e.g. long acting dextroamphetamine).

Step 3

- Still having problems? Switch to a Second-Line Medication (i.e. Atomoxetine, Guanfacine XR, etc.)

CADDRA Guidelines

Name	Availability	Starting dose	Titration schedule per week (CADDRA)	Maximum dose/daily (CADDRA)
First Line Long Acting				
Amphetamine mixed salts (Adderall XR)	5, 10, 15, 20, 25, 30 mg cap	Children/adults: 5-10 mg q morning	5 mg /week	Child: 30 mg Adults 30 mg
Lisdexamfetamine (Vyvanse)	20, 30, 40, 50, 60 mg cap	20-30 mg mornings	10 mg / week	Child: 60 mg Youth/Adults: 70 mg

Methylphenidate (Biphentin)	10, 15, 20, 30, 40, 50, 60, 80 mg cap	10-20 mg mornings	10 mg /week	Child: 60 mg Youth/Adults 80 mg daily
Methylphenidate OROS (Concerta)	18, 27, 36, 54 mg tab	18 mg mornings	9-18 mg/week	Child: 72 mg Youth: 90 mg Adults 80 mg
Second-Line /Adjunctive				
Strattera (Atomoxetine)	10, 18, 25, 40, 60, 80, 100 mg cap	Child: 0.5 mg/kg/ day x at least 3-days Adult: Start 40 mg daily	Child: Usual target dosage is 1.2 mg/kg/day Adult: Usual target 80 mg daily	Child: Max 1.4 mg/kg/day Youth/Adults: 100 mg
Guanfacine (Intuniv XR)	1, 2, 3, 4 mg tab	1 mg	1 mg every 7-14 days	Child: 4 mg Youth/Adults 7 mg

Second Line Agents

Name	**Availability**	**Starting dose**	**Titration schedule per week (CADDRA)**	**Maximum dose/daily (CADDRA)**
Intermediate Acting Stimulants				
Ritalin SR (Methylphenidate)	20 mg tab	20 mg morning	20 mg / week	100 mg daily
Dexedrine spansules	10,15 mg spansule	10 mg daily	10 mg daily	Child/Youth: 20-30 mg Adults: 50 mg
Methylphenidate short acting (Ritalin)	10-20 mg	5 mg bid-tid Adult: up to qid	5-10 mg weekly	Child/Youth 60 mg Adults: 100 mg
Dexedrine	5 mg	2.5-5 mg bid	5 mg weekly	Child: 40 mg daily Adult: 50 mg daily

Third Line Agents

- Alpha-2 Adrenergic Antagonists (Clonidine [Catapres], Guanfacine [Intuniv])
  - Better for aggression, impulsivity, hyperactivity
  - Less effective for inattention, poor concentration
  - Prescribed as adjuncts with stimulants for aggression, tics, co-morbid ODD
  - May be given at night-time to address aggressiveness in the evening (as it can be sedating rather than interfere with sleep as stimulants would).

- Antidepressants (Desipramine, Nortriptyline, Imipramine, Bupropion, Venlafaxine)
  - Considered as 3rd line agents or adjunctive treatment especially when co--morbid mood/anxiety, substance use disorders
  - Less well studied; not thought to be as effective for core symptoms

Common Side Effects and Management Strategies

• Insomnia	• Consider switching to Atomoxetine since less insomnia • Avoid giving stimulants in the evening • Sleep Hygiene • Melatonin 3-6mg given 1-2 hrs before bed
• Rebound Hyperactivity	• Use long acting stimulant or more frequent dosing of short acting agent; • Switch to non-stimulant
• Appetite Suppression	• Take medication after breakfast • Switch to higher calorie foods and drinks, e.g. homogenized milk, Boost ™, high fat yoghurt, etc. • Instead of insisting on rigid meal and snack times, allow child to eat when hungry and graze throughout the day on nutritious snacks • If significant weight loss (e.g. over 10% body weight), switch to alternate stimulant or non-stimulant
• Growth Suppression	• Monitor height / weight • It is felt that ADHD medications may possibly lead to a very minor suppression of growth, i.e. potentially a 1” deficit overall • Practice of drug holidays has largely fallen out of favour, on the basis that most patients benefit not just during the school year, but during the whole year
• Tics	• Hold stimulant until tics disappear, and then restart stimulant to see if tics return • If tics return, consider • Add tic medication such as atypical antipsychotics (eg. Risperidone) or clonidine. • Consider switch to atomoxetine or imipramine
• Headaches	• Usually dissipate once on a stable dose for a few weeks • May treat with mild analgesics such as acetaminophen, ibuprufen

Psychoeducation and Psychosocial Interventions

- Educate key individuals (e.g. child, family, educators) about ADHD
  - Teach child about ADHD
  - Family / Home
  - Teaching parents and family members about ADHD, so that they may understand how to best approach a person with ADHD
  - Parenting approaches need to provide appropriate nurturing and affection, but also appropriate structure and consistency
  - Visual supports/strategies particularly helpful
- Educators / School
  - Students with ADHD may benefit for accommodations / modifications for ADHD
  - Write a letter to the school mentioning the diagnosis so that the school can initiate accommodations/modifications
  - Example of an ADHD letter

Parenting Skills Training for Parenting the Child with ADHD

Evidence-based parenting approaches generally include features such as:

- Explain to parents that parenting a child with ADHD requires an approach that takes into account the child's ADHD
- Spending regular positive 1:1 time with your child with ADHD, which may mean more physically active activities
- Using praise to encourage positive behaviours, with an emphasis on ensuring that there is more praise than criticism
- When talking to your child with ADHD, keep things brief and to the point
  - When making requests to a child with ADHD

    - One or two simple, clear instructions should be given at a time (as opposed to simply telling multiple instructions to your child).
    - The child should repeat the instructions back to ensure comprehension.
    - Consider using visual reinforcement, e.g. writing down your request
- Structured home environment
    - Consistent daily routines (e.g. the same wakeup, mealtime and bedtime routines)
    - Provide consistent schedules and routines with forewarning of any upcoming changes.
    - Clear expectations
    - Consistent responding
    - Positive attention for appropriate behaviors
- Family rules
    - Clear, concise rules should be provided for the behavior of all family members, with consistent followthrough of appropriate consequences and rewards.
- Discipline
    - Decrease inappropriate behavior by allowing:
        - natural consequences to the child's actions,
        - logical consequences linked to the offending behavior
    - When giving consequences, do so in a calm, business like manner, without showing anger.
    - Ensure appropriate consequences for maladaptive behaviors; with ADHD, short-term, immediate consequences are better than long-term consequences
    - E.g. If the ADHD child has positive behaviours, acknowledge or reward them as soon as possible, as opposed to waiting too long
    - Showing anger may stop behaviours in the short run, but it damages the parent-child relationship in the long-run
    - In the long run, having a strong parent-child relationship is the best motivator for positive behaviour.
- Sleep
    - Create consistent sleep habits and a restful sleep environment.
    - Distraction-free zones
    - Have a special quiet spot with few distracting influences for doing homework or working on projects.
- Collaborative problem-solving
    - When possible, rather than simply telling the child what to do, give the child some choices within set limits so that the child has a sense of some control
        - E.g. Parent: "Everyone has to contribute by helping out at dinner. What would you like to help out with?"
        - E.g. Parent: "When you have done your homework, then we can do something fun together. For example, we can go to the park together, go swimming, or do something else... What do you want to do after your homework is done?"
    - Externalize the problem
        - Make sure the child knows his or her behavior is the issue or problem, not the child himself or herself.
        - Parent: "I love you, and it hurts me to see this behavour."
    - For negative behaviours
        - Utilize differential social attention to decrease ADHD behaviors that are not aggressive or dangerous to self, others or property. You can do this by ignoring behaviors like interrupting others, wherein you provide no attention (e.g., eye contact, verbal, smiling at them, etc.) to the problem behavior (e.g., "Thanks for being quiet while I finished talking to my friend"). This strategy is often taught in parent training programs.
- Incorporate prevention strategies such as visuals (e.g., timers, posted hour rules, etc.) to promote on-task and adaptive behaviors.
- Be a role model for your children
    - Remember that your children absorb whatever they observe in others, such as their parents
    - Ensure that you are similarly showing appropriate coping methods in front of children so they can learn positive methods to channel their frustrations

    - For example
        - Talk about your feelings, e.g. "I feel... "
- Ensure that you have social support
    - Keep up your connections with close family members and friends for support

When and Where to Refer

Consider referral to

- Behavioural pediatrician for:
    - ADHD with comorbid conditions that require additional treatment such as mental health issues
    - When first-line treatment options (i.e. first line medications) have been unsuccessful.
- Neurology for query neurologic conditions (e.g. tics)
- Cardiology if there are possible cardiac issues that might be contraindications for ADHD medication.
- Psychology to help with Psychoeducational Assessment and/or strategies for learning issues
- OT /PT if sensory issues or developmental coordination disorder
    - Speech language pathology (SLP) if significant social skills issues

Case, Part 2

You give them a standardized questionnaire to fill out, and it shows significant levels of inattention and hyperactivity-impulsivity. You review the clinical symptoms of ADHD with them, and confirm that he does have clinically significant levels of inattention and impulsivity-hyperactivity at school and home.

You write a letter to the school stating your concerns about ADHD, so that the school can initiate appropriate accommodations/modifications. You ask them to come back in a month or two in order to review whether or not medications might be required…

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About this Document

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