ADHD in children and youth: Part 1 - Etiology, diagnosis, and comorbidity - CPS Podcast

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Introduction

Hi, my name is Renée Lurie and I am a third-year medical student at the University of Ottawa. This podcast was made in conjunction with PedCases and the Canadian Pediatric Society. This is part one of a three-part series based on the 2018 CPS Statement on Attention Deficit and Hyperactivity Disorder or ADHD. This podcast will focus on the new CPS statement, ADHD in children and youth: Part 1 - Etiology, diagnosis and comorbidity. These podcasts were created in conjunction with the authors of the statements: Dr. Stacey Bélanger, from the University of Montreal, Dr. Mark Feldman, from the University of Toronto, and Dr. Brenda Clark from the University of Alberta.

Learning Objectives

The learning objectives for this podcast are to:
1) Review the background and causes of ADHD.
2) Learn the diagnostic criteria for ADHD.
3) Understand the differential diagnosis for ADHD and explain why these are part of your differential.
4) Review common comorbid conditions.
5) Apply this new information to a clinical case.

Clinical Case

Let's begin with a clinical case. You are assessing Sam, a 7-year-old boy whose parents brought him into his primary care provider's office due to difficulties he is having at school. His parents report that his teachers have noticed that he has difficulty sitting still in class, waiting his turn to answer questions and listening and following instructions. His parents note that once he returns home from school, he has lots of energy, jumping and climbing on the furniture. He often appears to be daydreaming and can easily be distracted at home, school and when playing with

friends. His older cousin was diagnosed with ADHD after having similar difficulties at school when he was younger. Sam's parents wonder if he has ADHD and what interventions can help him at school.

Background

So, before we jump into diagnosing ADHD, let's discuss what exactly ADHD is and its causes!

ADHD or Attention Deficit Hyperactivity Disorder is a neurodevelopmental disorder. It is defined in the DSM-5 as a "persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, and negatively impacts social and academic/ occupational activities." ADHD is common! Around the world, it affects 3.4% of children and youth, and is the third most common mental health disorder.

Early diagnosis and treatment of ADHD is critical as it is associated with a number of unfavorable outcomes including educational problems leading to lower high school graduation and completion of post-secondary education, difficulty with peer relationships, and increased rates of car accidents and substance use. If there is a comorbid conduct disorder, there is an increased mortality risk.

Not only does it affect children, 50% will continue to have symptoms into adolescence and adulthood. Some predictors of the persistence include: combined inattention/hyperactivity symptoms, high symptom severity, comorbid mood disorder, greater than 3 additional comorbid DSM disorders, parental anxiety, and parental antisocial personality disorder.

Many parents and caregivers are quite concerned about what causes ADHD. Let's discuss how you would explain this to them.

Causes of ADHD

Research shows that ADHD is multifactorial, due to a combination of genetic, neurological and environmental factors. It is highly hereditary and due to multiple genes. Current research is looking at specific genes that may be involved in an individual's response to medications.

Pregnancy and child birth are also important factors in developing ADHD. For example, the risk of developing ADHD is higher in those that had in-utero exposure to alcohol and tobacco, and a low birth weight (<2500 grams). Other neurological factors such as hypoxic-anoxic and traumatic brain injuries and epilepsy disorders also

increase risk. Imaging studies show that ADHD is a disorder of early brain development, with differences seen in brain structure and functional activation in those with and without ADHD.

Finally, in terms of environmental factors, specific environmental toxins such as organophosphate pesticides have been linked to ADHD symptoms.

Now that we have discussed the background and causes of ADHD, how would you diagnose someone, like our patient Sam?

Making the diagnosis of ADHD

ADHD is a challenging medical condition to diagnose because its symptoms overlap with many other psychiatric and neurodevelopmental disorders, and the child often suffers from comorbidities. To assist in the diagnosis, clinicians will often use rating scales and screening tools such as the Conner's Comprehensive Behavior Rating scale and the ADHD Rating Scales IV. The parents, teacher(s), and sometimes the adolescent will be asked to complete one or more these tools. Since symptoms need to be present in multiple settings and impair everyday functioning to diagnose ADHD, gathering information from several sources is crucial.
It is more difficult to diagnose ADHD in two age groups – preschoolers and adolescents. Preschoolers are challenging because it is hard to obtain information about the child from non-parent sources. However, the two scales I previously mentioned are the only scales that have been validated for use in pre-school children. In this age group, it is recommended that before establishing a diagnosis and starting treatment in a child that has been sent for an ADHD assessment, the child's caregivers should enroll in a parent training program. This can help them develop management strategies for certain disruptive behaviours.

Adolescents are also a challenging group because it is often hard to receive information from multiple informants as high school students generally have multiple teachers and may spend less time around their primary caregivers. They are also less likely to self-report problematic behaviour and demonstrate overt behaviours. Therefore, always ask if ADHD symptoms were seen at a younger age! In this age group, it is also important to consider substance use, depression, and anxiety in the differential diagnosis or as comorbid conditions.

Now, let's discuss how we actually make the clinical diagnosis. To complete the diagnostic evaluation, it is important to schedule several visits to ensure all components of the assessment are completed and the child feels comfortable during this time. When taking the patient's history, ask about prenatal/perinatal events, medical, mental health history and the child's developmental and behavioural history, including motor, language and social milestones, temperament/emotional regulation

and attachment. As well, evaluate for any comorbid disorders, whether that be psychiatric, neurodevelopmental or physical. It's also important to obtain academic information and inquire about any learning disorders. Next, review their family's medical and mental health history, family functioning and any genetic disorders that run in the family. Finally, ensure parents, teachers and the patient, if they are an adolescent, complete standardized behaviour rating scales that test for the DSM-5 criteria for ADHD. Clinical impressions and standardized scales are still the best ways to identify ADHD symptoms. Although one cannot make the diagnosis based on rating scales alone, these are helpful to identify the severity of symptoms and how effective certain interventions may be.

Now, as you continue completing Sam's assessment, what types of symptoms or behaviours are important to ask about to make the diagnosis of ADHD?

The diagnosis of ADHD is based on criteria from the DSM-5. The DSM-5 characterizes ADHD in three ways – predominantly inattentive, predominantly hyperactive-impulsive or combined inattentive-hyperactive-impulsive. For each presentation, patients must meet six or more core symptoms persisting over at least a 6-month period, with at least some symptoms present before the age of 12. These symptoms must be present in two or more settings, such as school, work, home, or in other activities. They must negatively impair their functioning in academics, social relations or work. Symptoms must not be explained by another medical or psychiatric diagnosis.

Symptoms associated with an inattentive presentation include: making careless mistakes, difficulty sustaining attention and finishing tasks, poor listening, not following through on instructions, disorganized, disliking and/or avoiding tasks requiring sustained mental effort, losing things, being easily distracted, and forgetfulness. Those consistent with a predominantly hyperactive-impulsive presentation include: fidgeting or squirming, inability to remain seated when expected, running and climbing where inappropriate, inability to play quietly, acting as if "on the go and driven by a motor," excessively talking, blurting answers, difficulty waiting turn, and interrupting others. The degree of severity: mild, moderate, or severe, should be specified based on the number of symptoms and functional impairment.

Lastly, it is important to complete a physical and neurological exam and a dysmorphology assessment is required. Unless the physical history indicates, lab tests, genetic tests, EEGs and neuroimaging are not required. Moreover, psychological testing, assessing intellectual and executive function or academic skills, and speech-language assessments are not routinely indicated.

Case

Let's revisit our case to learn a bit more about Sam and see if he fits any of the criteria we just discussed. As you enter the room, Sam is sitting in a chair, and you notice he is fidgeting by tapping his legs on the ground. You begin to talk to Sam and his parents and ask why they came in today. Sam's mom notes that they and his teachers feel as if Sam is "always on the go" and has difficulty concentrating on tasks. Sam is currently in grade 2. They noted he had similar difficulties in grade 1; however, they have worsened in the past few months. At school, Sam has difficulty finishing tasks to completion. His desk is always messy and he frequently loses things. When the teacher asks the class a question, he will often blurt out the answer without raising his hand.

During your interview, Sam leaves his chair and wanders around the room, looking at the exam table and playing with the sink. Sam's parents tell you that it is typical for him to not stay engaged in a conversation and will either move around or daydream when someone is talking to him for an extended period of time.

At home, Sam is often climbing on the couch or other pieces of furniture and can't seem to keep still. He sometimes has difficulty following instructions, which can be an issue when they are trying to get ready for school in the mornings. He does have friends, but is easily distracted when playing with them and has issues taking turns.

Now that we know a bit more about Sam, what else is on your differential diagnosis? This will help determine which further questions you may ask.

Differential Diagnosis

There is a range of disorders to consider when diagnosing ADHD. Many of these are often mistaken for ADHD, or can also occur as a comorbidity, making the diagnosis even harder.

Common conditions that can be misdiagnosed as ADHD, in decreasing order of frequency, include:

1. Learning disorders
2. Sleep disorders
3. Oppositional defiant disorder
4. Anxiety disorder
5. Intellectual disability
6. Language disorder
7. Mood disorder
8. Tic disorder
9. Conduct disorder

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10. Autism spectrum disorder
11. Developmental coordination disorder

For example, disruptive and aggressive behaviours, seen in oppositional defiant disorder or ODD may be mistaken for hyperactivity or impulsivity. Whereas, anxiety and depressive disorders may be mistaken for inattentiveness. Finally, conditions with frequent changes in mood, such as bipolar and disruptive mood dysregulation disorder, may be misinterpreted as the combined presentation of ADHD. It is important to rule out PTSD or an adjustment disorder if there is a history of trauma or a stressor in the child's life.

Children with intellectual disabilities or learning or language disorders may be inattentive, disconnected or disruptive in class if the school work is too difficult for them. On the opposite side of the spectrum, those with above average intellectual functioning may be inattentive if they find themselves under-challenged in the classroom. If symptoms exist only in select settings, it is important to identify why this discrepancy exists.

Finally, it is important to recognize medical conditions that may display similar symptoms to ADHD. For example, conditions that result in fatigue or pain, such as sleep apnea and inflammatory bowel disease, visual or auditory impairments, and neurological conditions that affect attention, such as epilepsy. As well, if due to a chronic health condition, a child misses a lot of school, poor school performance may be attributed to ADHD but in reality the child is unable to keep up with what is being taught in class. A medical condition can also be comorbid with ADHD and treating the condition may help diagnose ADHD.

Comorbidity

Let's discuss a bit more about comorbidities as they can greatly effect symptom presentation, functioning and treatment approach. In terms of treatment, it is important that the disorder causing the greatest impairments is managed first.

Certain disorders have a higher prevalence of ADHD than other conditions. ADHD in autism spectrum disorder, intellectual disability, and individuals born preterm will be discussed in part three of this series.

Another comorbidity is epilepsy. ADHD symptoms usually present at or before the first seizure. Those with complex epilepsy, more frequent seizures, and earlier onset age, have a higher risk of ADHD. Some antiepileptic medications can also affect attention. Children with genetic conditions, such as Fragile X and Turners syndrome, have a higher occurrence of ADHD than the general population. Depending on the conditions

and its other manifestations, symptoms of ADHD may be the first signs of the condition or can be seen after other signs.

Neurodevelopmental and psychiatric comorbidities include disruptive behaviour disorders, such as oppositional defiant disorder and conduct disorder, anxiety, obsessive compulsive, mood, substance use, eating, and tic disorders. The most common comorbid disorder associated with ADHD is a specific learning disorder, found in one-third of children with ADHD. If these comorbidities are suspected and/or if making a diagnosis is challenging, consider referring to a specialist or subspecialist in the area.

Now let's go back to Sam! After completing a thorough history and physical exam, you explain the differential diagnoses to Sam's parents. You ask that they and Sam's teachers complete screening scales to provide additional information on Sam's behaviour. You schedule a follow-up appointment to discuss the results of their responses.

Conclusion

That concludes our first podcast. Let's review our main points:

1. To diagnose ADHD, a thorough history and physical examination are necessary. It is important to keep in mind that one needs to establish a differential diagnosis and identify the comorbidities to ensure the correct diagnosis is made.
2. It is important to obtain collateral information to get a wider understanding of the child's behaviours in different settings.
3. Standardized screening tools are helpful and can be found on the CPS website.
4. There are a wide range of medical, psychiatric and neurodevelopmental comorbidities associated with ADHD.
5. If the diagnosis of ADHD is complex, including the presence of multiple comorbidities or a complex differential diagnosis, a referral to a specialist should be considered.

Thank you for listening! Please stay tuned for Part 2 where we will discuss the treatment of ADHD.

References

1. Bélanger SA, Andrews D, Gray C, et al. ADHD in children and youth: Part 1 — Etiology, diagnosis, and comorbidity. Paediatr Child Health. 2018 Oct 24; 23(7):447–453.

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