ADHD in Children and Adolescents

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INTRODUCTION

Attention-deficit hyperactivity disorder (ADHD) can cause significant impairment in the lives of children and adolescents, and their families. The approach to this behavioural disorder can be challenging due to its complexity—the time and knowledge needed for assessment, the number of differential diagnoses and comorbidities, and the choice of effective treatments. Usually the first point of contact, primary care clinicians play a pivotal role in the recognition, diagnosis and management of ADHD while working alongside parents, teachers and consultants.

OBJECTIVES

This module will enable clinicians to:

- Assess and diagnose children and adolescents presenting with symptoms suggestive of ADHD.
- Determine an appropriate management strategy for patients with ADHD, including monitoring, follow-up and the need for referral—all consistent with patient and parent preferences.
- Develop an approach to identify clinical presentations that may be comorbid with ADHD and potentially alter management or require consultation.

CONTENTS

CASES

Case 1: Max, age 6.5, and his mother Chelsea

Chelsea brings her son Max to see you in your office today. Chelsea is concerned about Max's behaviour over the last 6 to 12 months. Specifically, she says that he is "always on the go" and she is concerned about his safety as he was almost hit by a car last week when he ran across a parking lot. He is always running, jumping or climbing on something, and she wishes that, at times, he would just sit and play quietly.

Chelsea says that Max often gets in trouble at school for blurting out in class and the teacher has asked to discuss her concerns at a parent–teacher meeting next week. Max just started playing hockey and she is hoping that this will help him "get some of his energy out." Chelsea is wondering if Max is "hyperactive." She says that her husband thinks he is just a normal 6-year-old boy. Chelsea and her family just recently moved to your city and are new to your practice.

What additional information would you like to know? What would you do in clinic today?

Part Two

Max lives with Chelsea, his father, Darren, and his 3-year-old brother, Jack. Darren works as a geologist at one of the northern mines and is gone from the house for several weeks at a time. Chelsea does not work outside of the house. She has minimal help with the kids when Darren is away as she has no family in town.

Max was born at 38 weeks gestational age (GA) after an uncomplicated vaginal delivery. Chelsea says that he met all of his developmental milestones. Max was always an active baby and toddler, which she found difficult at times. She often brought him to play groups but then had to leave early because he either ran away or wouldn't sit for story time. He did not attend preschool

or daycare. Chelsea is careful with screen time (she tries to limit him to a half-hour of screen time per day) but states that this is almost the only time he sits still. He has no difficulty sleeping, has a good appetite and a well-balanced diet. Chelsea does not know much about how Max is doing at hockey as Darren takes him to practice when he is at home, and otherwise a friend drives him. Darren had some difficulties with hyperactivity and injuries in grade school, although he was never given a formal diagnosis. There is no history of mental health disorders in the family and no family dynamic issues, although Max often fights with his younger brother.

In your office today, Max is busy playing on a device, continuously shifting in his chair and talking about the game. He is somewhat reluctant to put it away but does so when firmly asked. He happily sits on the exam table but tries to reach for the otoscope and ophthalmoscope, despite his mother's repeated admonitions. Physical examination is normal. His weight is 22.3 kg, height 117 cm and BMI 16.3 (50th percentile for his age).

How would you address Chelsea's concern today?

Part Three—One month later

Chelsea returns a month later for a follow-up visit. She has agreed to come to today's visit alone so that you can have an uninterrupted discussion about her concerns. She met with Max's teacher the week after your last visit, who reiterated her concern about Max's inability to sit quietly in class and his constant interruptions. Chelsea is now helping in the classroom and has seen this first hand.

She and Darren, as well as Max's teacher, have completed the ADHD rating scale you gave them. Although initially reluctant, Darren has become more open to the idea that Max may have some behavioural issues. He has noticed that Max does have trouble waiting his turn in hockey practice and is often shooting pucks when the rest of the team is watching the coach.

You look at the completed ADHD rating scales, which are all highly suggestive of ADHD (combined presentation). Chelsea asks what further testing needs to be done. She is very concerned about whether Max needs medication and has many questions.

What would be your next steps? How would you follow Max?

How would you respond if Chelsea asked about testing Max's younger brother, Jack?

Case 2: Megan, age 16, and her mother Tanya

Megan and her mother, Tanya, come to your office today. When you ask Megan why she has come to see you, she just looks at her mom. Tanya then states that both Megan and Tanya are concerned about some difficulties Megan is having at school. Megan is just starting the second semester of Grade 10 and, over the last several months, has been finding it more difficult to keep up with her schoolwork. Recently her grades have begun to drop. Tanya is most concerned about how worried Megan is about her school performance.

Megan says she is having to stay up late at night most evenings to finish any work that she didn't complete during the school day. She often forgets resources she needs at school, making it even more difficult to get her work done in the evening. She does not describe specific problems with Math or English. Megan's goal is to go to university and is afraid that she will not be accepted if her marks in her final years of high school are not good.

What additional information would you like to know? What would you do in clinic today?

Part Two

Megan's family members, including her 12-year-old brother and both her parents, are all part of your practice and Megan has been your patient since birth. You recall that she was born via Caesarean section at 36 weeks GA due to premature rupture of membranes. Although she was small for gestational age, she only spent a short period of time in the NICU. She met all of her developmental milestones. You recall that Megan was always a quiet child and that her parents described her as a "dreamer." You saw her for regular check-ups, but she was otherwise well. When asked about her school history, Megan says that although she has never felt that school was easy, and often had to struggle to keep up with assignments, she has managed to maintain good grades. Megan has always had B's on her report card, but received two C's on her midterm report, which clearly bothers her. This year, Megan has started taking courses needed to attend university. She says that nothing else has really changed at school, although she has chosen to spend less time with her friends because of the time spent on schoolwork.

Tanya says that Megan is more tired than usual and that she is less tolerant of her younger brother. Megan admits to about 7 hours of sleep each night, from about midnight to 7 am. Tanya is also worried that Megan is not eating well, as she is often running late in the morning and skips breakfast. She sometimes consumes energy drinks to keep herself awake. Although Megan has previously played on her school volleyball team, she decided not to join the team this year to focus on her studies.

You ask Tanya to leave the room while you examine Megan. During your examination, you ask Megan more about her school and friends. She says that although she spends less time with them, she still talks to her friends at school and through social media. She enjoys getting together with them when she has free time.

She is not sexually active and is not using any recreational drugs. She has had alcohol occasionally at parties but does not drink regularly. Although she says that she feels "down" sometimes, this is infrequent and she denies thoughts of self-harm or suicidal ideation. Her physical examination is normal. You ask Megan to do a PHQ-9 in the office and her score is 8. You also have her complete a screening tool for anxiety which does not suggest any concerns. Her BMI is 50th percentile for age which has been stable and she feels comfortable with her weight.

What would be your next steps?

Part Three—One month later

You see Megan and Tanya in follow-up approximately one month later. You have Megan repeat a PHQ-9 before you see her, and it is unchanged since her last visit. They bring ADHD rating scales completed by Megan, her parents and 2 of her teachers. Tanya does have some old report cards from primary school. Relevant teacher comments include: "Easily distractible, needs consistent reminders to stay on task. Sometimes has difficulty paying attention." Based on all of the information you have gathered, a diagnosis of ADHD (predominantly inattentive presentation) seems appropriate, using the DSM-5 criteria.

How would you manage Megan?

INFORMATION SECTION

BACKGROUND

1. ADHD is a neurodevelopment disorder defined as "a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development…and negatively impacts directly on social and academic/occupational activities."[1]

2. ADHD is one of the most common mental health disorders in children and adolescents, with an estimated prevalence of 5 to 9% of this population.[2,3] In a 2015 meta-analysis and systematic review, the global prevalence was 7.2% which did not vary by DSM edition. The prevalence was lower in North America compared to the Middle East but higher compared with Europe.[4]

a) ADHD is diagnosed more commonly in boys than in girls in part because the "hyperactive" behaviours are more easily observed in boys.[3]
b) More than 50% of those diagnosed with ADHD during childhood or adolescence will continue having significant symptoms in adulthood.[2,5]

3. ADHD is associated with several adverse outcomes including:
   a) Educational problems—which result in low rates of graduation from high school and completion of post-secondary education.
   b) Difficult peer relationships.
   c) Increased rates of motor vehicle accidents and accidental injuries—those with ADHD are nearly 2 times more likely to be injured (e.g., burns, fractures, traffic injuries) compared to controls.[6]
   d) Substance abuse.

   When ADHD is comorbid with other disorders, the risk of adverse outcomes, such as substance abuse and mortality, increases.[7-9]

4. Early diagnosis and treatment is associated with improved outcomes in educational, work and social domains.[10,11]

5. The etiology of ADHD is believed to be multifactorial.[12]
   a) Genetics: Family, twin and adoption studies suggest a strong hereditary, polygenic aspect to ADHD. Heritability has been estimated to be as high as 80% for monozygotic twin studies and 40% for dizygotic twins.[13,14]
   b) Neurological: Strong evidence supports an increased risk of ADHD in association with low birth weight (< 2,500 g) and following in-utero exposure to alcohol, tobacco or cannabis. Other factors contributing to ADHD risk include hypoxic-anoxic brain injury, epilepsy and traumatic brain injury.[12,15,16]
   c) Environmental: Exposure to toxins (lead, organophosphate pesticides, polychlorinated biphenyls) has been linked to ADHD.[17,18] Apart from exceptional early deprivation, the role of family environment and psychosocial adversity is unclear.[15,19]

ASSESSMENT AND DIAGNOSIS (Appendix 1)

Box 1. Clinical Resources

The Canadian ADHD Resource Alliance (CADDRA) provides a toolkit of clinical resources including both hard copy and pdf-fillable assessment, treatment and follow-up forms, as well as templates for educational accommodation letters. The toolkit can be accessed at https://www.caddra.ca/etoolkit-forms/.

6. In ADHD guidelines, the term "preschooler" refers to children age 4 to 6. In Canada, most children of this age are in school already. As a result, the term "preschooler" will not be used in this module.

7. An evaluation for ADHD is recommended for any child over age 4 who presents with academic or behavioural problems and symptoms of inattention, hyperactivity or impulsivity [Strong Recommendation].[3]

8. In children younger than age 4, it can be difficult to gather reliable observations from non-parent sources.[3] However, due to the high heritability and impact of environmental causes (Info point 5), it may be prudent to "be on the lookout" for youngsters with high levels of inattention and/or hyperactivity/impulsivity.[20]

9. Adolescents with ADHD tend to have a decline in their hyperactive and impulsive symptoms with persistence of inattention.[3]

10. The diagnosis of ADHD can be challenging due to a lack of specific biomarkers or symptoms, the presence of comorbidities and a wide differential. These differential diagnoses often occur as comorbidities, rather than as distinct disorders (Box 2; Info point 12). A systematic approach to the history, and the use of rating scales and screening tools can help gather the necessary diagnostic information from multiple sources (Info point 14).[12] Key elements in diagnosis are the presence of symptoms across multiple settings and impairment in everyday activities.[12]

Box 2. Differential Diagnosis/Comorbidities* [2,12]

- Learning disorder*
- Sleep disorder*
- Oppositional defiant disorder*
- Anxiety disorder*
- Intellectual disability*
- Disorders of language, mood, tic, conduct*
- Autism spectrum disorder*
- Developmental coordination disorder*
- Medical conditions such as severe anemia, thyroid dysfunction, hearing or vision impairment
- Medication that can be either activating or sedating

* Frequent comorbidities

11. A thorough assessment, typically done over several office visits, should review or evaluate:
- Prenatal/perinatal events, medical and health history.
- Lifestyle—sleep, exercise, screen time, high-risk activities, accidents, substance use, sexual activity (if relevant).
- Developmental and behavioural history—motor, language, social milestones, behaviour.
- Family medical/health, family functioning and coping styles, history of ADHD and genetic disorders.
- Academic progress—e.g., report cards, sample assignments.[12]

12. Most children with ADHD (50–90%) have at least one comorbid condition. The most common comorbid disorders in early childhood are oppositional defiant disorder (ODD), conduct disorder, learning disorders and anxiety disorders. Other associated conditions include tic disorder, developmental coordination disorder, autism spectrum disorder, and (particularly in adolescents), eating, mood and substance-use disorders.[2]
    - Although detailed information on the diagnosis of these disorders is beyond the scope of this module, the following modules may be helpful: Autism Spectrum Disorder in Children (August 2018); Eating Disorders (August 2019); Anxiety in Children and Adolescents (May 2018). All are available at: https://members.fmpe.org/.

13. The use of a standardized rating scale is a key assessment for gathering information from several sources including the patient (if age-appropriate), parents and teachers. Rating scales on their own should not be used to formally diagnose ADHD due to variability in interpretation of questions by the respondent. Scales are also helpful for monitoring the effects of treatment in home and at school.[2,12] Obtaining teacher reports for adolescents can be more challenging as they are often in more than one classroom with less individual contact time. Obtaining copies of elementary school report cards can be helpful in these circumstances.[3]

14. There are ADHD-specific scales and those that assess ADHD along with a variety of comorbid conditions. One of the most commonly used rating scales is the SNAP-IV. There are several versions of this tool that can be completed by both teachers and parents, and they are accessible free of charge.
    a) The detailed 90-item questionnaire is a broadband tool that also contains items related to disorders that may overlap or be comorbid with ADHD. It should not be used to diagnose these other disorders—positive responses should prompt a more detailed assessment and potentially a psychiatric opinion.[2]
    b) The abbreviated 26-item questionnaire for both teachers and parents assesses both ADHD and ODD since these commonly overlap.[21] In a validation study of this version (n=250 children age 6–17 referred to a pediatrician or pediatric mental health service in the UK), parent and teacher ratings on SNAP-IV demonstrated a sensitivity of 100% and 96%, but a poor specificity of 4.4% and 26% respectively when compared with expert clinical diagnosis. The specificity of the scale is better for hyperactivity compared with inattention.[22]
    c) The 18-item version assesses only ADHD symptomatology.

    Note*:* Although the Conner's abbreviated symptom questionnaire appears to have the best diagnostic performance for ADHD based on a recent meta-analysis, it is only available for purchase and is expensive.[23]

Box 3. SNAP-IV Links with Scoring Information

- 90-item questionnaire: http://www.shared-care.ca/files/SNAP_IV_Long_with_Scoring.pdf
- 26-item questionnaire: http://www.shared-care.ca/files/Scoring_for_SNAP_IV_Guide_26-item.pdf and https://www.caddra.ca/wp-content/uploads/SNAP-IV-26-Teacher-Parent-Rating-Scale-Fillable-Form.pdf (fillable version)

15. Unless indicated by history and physical exam, the following tests are not recommended:
    a) Laboratory tests, genetic testing, EEG or neuroimaging.[2,24]
    b) Assessment of intellectual and neuropsychological function, academic achievement and speech/language skills.[2]
    c) Psychological tests—e.g., TEACH (Teach of Everyday Attention for Children), Continuous Performance Tests or measures of executive function.[12]

16. To make a formal diagnosis of ADHD, the DSM-5 criteria (Appendix 2) should be met, including documentation of symptoms and impairment in more than one major setting, with information from parents or caregivers, teachers and mental health clinicians involved in the patient's care (if relevant).[1] These symptoms must begin by age 12 and there should not be an alternative explanation for the symptoms.[2]

REVIEWER COMMENT
The DSM-5 is not written in stone. It is a guide and not absolute, so if a patient has most but not all of the criteria, you cannot eliminate the diagnosis if your clinical impression is that the patient has ADHD. It is important to consider how severe the impairment is for the patient.

MANAGEMENT

17. As a chronic condition, ADHD requires a shared-care management approach with the patient and parents/caregivers that is based on an understanding of its etiology, and a discussion of goals and preferences regarding management.[12]

Non-pharmacologic

18. Several current guidelines recommend that non-pharmacologic options—parental education and support, behavioural interventions, psychological treatments and educational accommodations—should be offered first, although this would depend on the severity of the impairment.[2,3,24]

19. Important principles at home include promoting a structured lifestyle and home life with help to prioritize activities, provide visual reminders and use timers or apps for deadlines. Instructions and limits should be clear, using positive parenting to assist with emotional regulation.[21]
    Note*:* For positive parenting tips, see the PBSG module Behavioural Challenges in Parenting: Children 12 Years and Younger (Feb 2020) available at: https://members.fmpe.org/.

Box 4. Psychosocial Interventions: Detailed Information

CADDRA provides a one-page summary guide to psychoeducation at: https://caddra.ca/pdfs/Psychosocial_October2016.pdf. The full guidelines provide more detailed information on a wide range of psychosocial interventions (instructional, behavioural, environmental) that can be done at home and school and used to counsel parents and patients in the office. To view this information, go to: https://www.caddra.ca/canadian-adhd-practice-guidelines/ (pages 45–50; Tables 4.2 and 4.3—Home and School interventions). A brief registration needs to be completed (takes < 5 minutes), but the full guidelines can then be downloaded for free.

Psychoeducation and Lifestyle

20. Psychoeducation aims to provide accurate information on ADHD to patients and their families to educate and empower them.[2] This can be group-based and occur over one or more sessions.[24] Although the evidence is of low quality, a qualitative systematic review of 4 RCTs and 3 uncontrolled pre-post trials found improvement in child behaviour, parent and child satisfaction, and adherence to treatment.[25]

21. Elements of psychoeducation include:
    a) Debunking common myths associated with ADHD (see ADHD Myths and Facts handout, end of module).
    b) Providing education about ADHD and its symptoms, and the rationale behind suggested treatment approaches (including the risk and benefits). Information about community resources and support groups (see Online Resources handout, end of module) is important.
    c) Giving hope to families that evidence-based treatments exist and work.
    d) Empathizing with the challenges of raising a child with ADHD, but also the strengths in the family and child.
    e) Promoting a balanced lifestyle, including sleep hygiene, exercise and good nutrition.[2,24]

22. Regular exercise reduces stress and improves focus and mood. A systematic review (8 RCTs, n=249) found that aerobic exercise had a moderate-to-large effect on core symptoms such as inattention, hyperactivity, and impulsivity and related symptoms (e.g., anxiety, executive function and social disorders).[26]
    Note*:* The mean duration of sessions was 50 minutes, done 2 to 3 times per week at a moderate intensity.

23. There is insufficient or no evidence to advise diet modification, and guidelines recommend against free fatty acid or vitamin and mineral supplementation, or elimination of specific foods, artificial colouring and additives.[3,2,24] Dietary focus may run the risk of nutritional deficiency and shift parents away from more efficacious treatments. However, if parents feel that there is a clear link, they should be encouraged to keep a diary of a child's intake of food and drink and the associated ADHD behaviour. Offer referral to a dietitian (where available) if the diary supports a relationship between specific foods/drinks and behaviour.[24]

Behaviour Management Training (Parents)

24. Behaviour management training helps parents to learn age-appropriate developmental expectations, behaviours that strengthen the parent–child relationship and specific skills for dealing with problem behaviours.[12]
    a) A meta-analysis (32 RCTs, n=2,057) showed that this training significantly improved parenting skills, conduct problems, ADHD symptoms, social skills and school performance.[27]
    b) A Cochrane Review (22 RCTs and 2 quasi-RCTs, n=3,161) found low quality evidence suggesting that group-based parenting programs may reduce negative behaviour and improve positive behaviour.[28]
    c) A network meta-analysis (15 RCTs, n=1,016) found that behavioural therapy, particularly given by parents with active child and teacher involvement, had statistically significant benefits for improving behaviour—odds ratio (OR)* 2.97, 95% CI 1.53–5.88 [Low Evidence]. Treatment effects were larger when behavioural therapy was combined with stimulants (8 trials, n=521)—OR 13.62, 95% CI 6.83–27.93—and nonstimulants (4 trials, n=480)—OR 6.05, 95% CI 2.39–15.27 [Very Low Evidence].[29]
    * For an explanation of OR, please see the Quick Statistical Concept box on page 15.

25. The American Academy of Pediatrics (AAP) recommends parent training in behaviour management for the following scenarios:
    a) As a first-line treatment for children age 4 to 6 with ADHD [Grade A, Strong Recommendation] as well as those with ADHD-like behaviours whose diagnosis is not yet verified.
    b) In combination with medication for children age 6 to 12 with ADHD [Grade A, Strong Recommendation].[3]

Cognitive Behavioural Strategies (Children and Adolescents)

26. A meta-analysis of RCTs (n=759) provides little support for cognitive training (training of attention and working memory) as a front-line treatment for ADHD.[30]
    a) The study found no significant effects on total ADHD and inattention symptoms.[30]
    b) Although there were large, highly significant improvements in both visual and verbal working memory, these effects did not translate into improved academic performance.[30]
    Note: Trials were not excluded if patients received medication as part of normal treatment (a confounder).

27. For cognitive behavioural training (CBT), studies on treatment outcomes in children and adolescents with ADHD have been mixed,[2] and meaningful improvements in functioning have not been reported.[3]
    a) The use of CBT as an adjunctive therapy may be an option for adolescents. A small RCT (n=99)of adolescents with ADHD taking medication (methylphenidate and atomoxetine) but with persistent symptoms, found that those in the CBT group experienced a reduction in core symptoms, symptom severity and functional impairment compared to those in the control group.[31]
    b) The NICE guidelines recommend consideration of CBT in young people who have benefited from medication but whose symptoms continue to cause significant impairment.[24]

28. There is very low quality evidence (very small trials, primarily adolescents) for the use of relaxation techniques (e.g., deep breathing, yoga)[32] and mindfulness training. These modalities are not recommended by the AAP.[3]

Pharmacologic

29. Medication is appropriate for children over age 6 "whose learning or academic performance are impaired by attention difficulties or whose behaviours and social interactions are impaired by lack of impulse control and hyperactivity."[12] Consultation should be obtained before using pharmacotherapy in children younger than 6.[2]

30. Decisions about when a medication should be given and how long it needs to last should be made in concert with the patient (if applicable) and family/caregivers. For most patients, the duration of a medication's effect must extend beyond the classroom and into the evening, weekend and holidays.[2]

31. Some ADHD medications are costly and may not be feasible for patients/families without third party insurance. Reimbursement may be available through provincial/territorial drug plans—an online guide is available at: https://www.caddra.ca/provincial-and-federal-public-formulary-overview/.

32. Evidence suggests there may be pharmacokinetic differences in some generic and brand name formulations of ADHD drugs that impact duration of action and also make some products easier to crush and abuse. If brands are switched, the patient/family should be advised and asked to watch for and report any changes in efficacy or tolerability.[2]

See Appendix 3 for a detailed overview of medication—duration of action, dose and titration, side effects and costs.

Stimulants—First-Line

33. Stimulant medications are considered first-line in children and adolescents with ADHD. A network meta-analysis found that, compared to placebo, stimulants (53 RCTs, n=5,831) were more effective than nonstimulants (40 RCTs, n=4,741) with an OR of 6.21 (95% CI 4.89–7.96) versus an OR of 3.95 (95% CI 3.13–5.07) respectively [Low Evidence].[29] See Table 1 for contraindications and precautions for stimulant medication.

Table 1. Stimulants: Contraindications and Precautions[2]

Contraindications	Precautions
• Treatment with MAOIs* and for up to 14 days after discontinuation • Glaucoma (narrow angle) • Untreated hyperthyroidism • Moderate to severe hypertension • Pheochromocytoma • Symptomatic cardiovascular disease • History of mania or psychosis	• History of substance abuse • Anxiety • Renal impairment • Tic disorders • Epilepsy • Peripheral vasculopathy including Raynaud's phenomenon

* Monoamine oxidase inhibitors

34. A recent Cochrane Review found no evidence that one stimulant is better than another.[33] Individual patients, however, may have a better response or tolerate one agent over another. For this reason, CADDRA recommends a trial of both classes of stimulants (amphetamines and methylphenidate) before trying a second-line nonstimulant.[2] It appears that the sub-type of ADHD does not predict the response to a specific agent.[1]

35. Stimulant medications can affect BP and heart rate. Prior to initiation, cardiovascular risk should be evaluated with a detailed medical history—personal cardiac symptoms, family cardiac history (prolonged QT, sudden cardiac death)—and cardiac exam. Unless a patient has an increased risk of cardiovascular adverse events due to stimulant use, routine ECG monitoring is not indicated. BP and heart rate should be measured before treatment initiation and during follow-up. There is no evidence that stimulant medication increases the rate of sudden death or stroke based on several large US databases.[2]

Immediate-Release Versus Extended-Release

36. When choosing between immediate-release and extended-release formulations, consider their relative advantages and disadvantages (Table 2).

Table 2. Immediate- and Extended-Release Stimulants: Advantages and Disadvantages[1,2,12,24]

	Advantages	Disadvantages
Extended-Release (first-line)	• Improved compliance • No in-school dosing • Reduced social stigma • Less potential for drug diversion • Controlled-release minimizes rapid absorption and delivery to brain • Better symptom coverage for patients requiring symptom control in the evening	• Expensive and some may not be covered by all insurance plans • Appetite suppression • Sleep problems

Immediate-Release (second-line)	• Suitable for:
	  ○ The need for more flexible dosing regimens for patients with short-term treatment targets
	  ○ Titration to identify correct dose
		• Much higher risk of drug diversion
		• Reduced compliance
		• Prone to peak/valley clinical effects

Nonstimulants

Second-Line

37. Nonstimulant medication is recommended for patients who cannot tolerate stimulants or whose symptoms have not responded to adequate doses and trials of both classes of stimulants.[2,24] Compared with stimulants, nonstimulants have a lower risk of abuse or diversion and may be a better choice where this is a concern, such as a history of substance use or evidence of diversion (see Info point 48).[3,12] Nonstimulant medication needs to be taken continuously for effect.[2]

38. Atomoxetine (a selective norepinephrine reuptake inhibitor) and guanfacine XR (an alpha-2 agonist) are approved by Health Canada for treating children and adolescents with ADHD. Compared to stimulants, nonstimulants have lower response rates and effect size (Info point 33).[12,29] Guanfacine XR is usually used in combination with stimulants (Info point 41).
    a) Contraindications to atomoxetine are the same as for stimulant medication (Table 1). Precaution is recommended for those with asthma or who are CYP2D6 poor metabolizers.[2]
    b) Abrupt discontinuation of alpha-2 agonists, guanfacine and clonidine (see Info point 39), can cause rebound hypertension. It is essential that the patient/parents be completely reliable and take the medication consistently. Tapering should be done gradually (1 mg every 3–7 days).[2,3]

Third-Line

39. Clonidine has shown a significant improvement in ADHD symptoms and tics.[34] However, its use in children is not currently approved by Health Canada.[35] Other third-line options include bupropion, imipramine and modafinil. All third-line agents are generally reserved for treatment-resistant cases and require specialist referral.[2]

Combination Therapy

40. Combining medications may be considered for:
    a) Adding an ADHD agent with a different mechanism when a stimulant is not fully effective or its use is limited by side effects.[2]
    b) Adding an immediate-release agent for uncovered portions of day—for example, using an extended-release methylphenidate in the morning and an immediate-release methylphenidate later in the day to extend the duration of effect. This could be an option if increasing the morning dose of the extended-release is either not tolerated or ineffective.[24]
    c) Adding another treatment for comorbidities (e.g., mood disorders, sleep problems).[1,2]

41. Guanfacine XR is the only nonstimulant approved by Health Canada for combination treatment with stimulants. An RCT (n=461) found that the addition of guanfacine to a long-acting stimulant resulted in significantly greater improvement in ADHD symptom scores compared to a stimulant plus placebo (p=.002 for am dose; p<.001 for pm dose).[36]
    - Off-label use of combination atomoxetine/stimulant therapy is common, although a systematic review found there is little evidence to support this approach.[2,37]

42. Combining behavioural therapy with stimulants (OR 13.62, 95% CI 6.83–27.93) [Very Low Evidence] and, to a lesser extent, nonstimulants (OR 6.05, 95% CI 2.39–15.27) [Very Low Evidence] was found to be superior to monotherapy with stimulants or nonstimulants.[29] CBT combined with medication may be an option in adolescents (see Info point 27).

Titration and Monitoring

43. Symptoms and functional impairment should be documented at baseline and then at each dose change with a rating scale completed by patient (if applicable), parents and teachers (see Info point 13).[24] As the effects of stimulants appear quickly, a visit within a few weeks of dose changes is reasonable. Once stable, the frequency of monitoring is a matter of clinical judgment and depends on the presence of comorbidities and the patient/family situation.

REVIEWER COMMENT
Initially patients should be seen within 2–4 weeks, depending on available appointments and how quickly that patient wants to titrate upwards and then, when stable, every 3–6 months. Frequency also depends on how capable the patient/family is and the presence of comorbid disorders that may impact treatment.

44. The dose should be carefully titrated (see Appendix 3) against symptoms and side effects until the optimal dose has resulted in reduced symptoms, positive behaviour change, improvements in school and relationships, and tolerable side effects.[12,24] In general, the "start low and go slow" approach is advised.[2]
    a) The CADDRA toolkit contains a Clinician ADHD Baseline/Follow-up Form that can be used for monitoring purposes. It can be accessed at https://www.caddra.ca/etoolkit-forms/.
    b) A pdf-fillable version is also available at: https://www.caddra.ca/wp-content/uploads/CADDRA-Clinician-ADHD-Baseline-Follow-Up-Fillable-Form.pdf.

Side Effects

45. In general, ADHD medications are well tolerated but individual patients may be more sensitive to one agent over another. Advise patients and their families about potential side effects (Appendix 3).[2]
    a) Physical side effects sometimes improve over several days particularly with regular dosing.[2]
    b) Ensure that no other stimulants, such as caffeine, are being consumed.[2]
    c) Sometimes, side effects can be managed by changing the timing of medication (e.g., early morning dosing for insomnia).[2]
    d) Assessment for compliance is important, particularly in adolescents, where medication discontinuation is common.[3]

46. A regular schedule for follow-up should be established with the patient and family to monitor for treatment effectiveness as well as changes in sleep, appetite, BP, heart rate and mood. Frequency will depend upon stability. Guidelines recommend ongoing monitoring of height and weight in patients taking stimulants.[2,12,24]
    a) The impact on growth is contradictory. A recent observational study (n=515) found that consistent use of stimulants over many years (> 10 years) has been associated with a small reduction in growth of approximately 2.5 cm.[38] Conversely, a case control study (n=1,020) found stimulants had no effect on final adult height.[39]
    b) A reduction in BMI may be evident in patients taking stimulants, particularly those who were overweight before treatment. This may explain why children on stimulants may have a slight delay in growth-spurt timing compared to their peers.[12]

47. The decision to take children off their medication should be individualized. The child or adolescent may have less insight into the functional benefits of medication beyond the educational setting (e.g., while driving, behaviour at home or during recreational activities). Taking time off medication or reducing dose may be recommended if:
    - There are impacts on appetite and growth.
    - There are other side effects.
    - The family or other objective observer feels there is no apparent benefit such as during vacation.[2]

Abuse/Diversion/Misuse

48. Compared to extended-release stimulants, immediate-release (short-acting) formulations have a much higher risk of diversion and misuse or abuse. As this is a significant risk among adolescents, it is vital to monitor an adolescent's symptoms, prescription refill requests and other signs of diversion and misuse.[1,2] If a substance use disorder is suspected, advice from a colleague with this expertise may be helpful. In addition, nonstimulant medication may be preferred for treatment.[3]

Treatment Response

49. Within 2 to 4 weeks of treatment initiation, treatment response and tolerability can generally be determined. Nonstimulants generally take longer than stimulants for the full benefit to be observed (Appendix 3).[12,40,41]

50. If the response to one class of stimulant is not optimal despite titration and an adequate trial, or if side effects are intolerable, switching to another class of stimulant may be warranted (see Appendix 3).[2,12]
    a) If treatment response is still not improved, augmentation with a nonstimulant may be considered (see Info point 41).[2,12]
    b) Medication switching is best done during long vacations or over the summer to avoid any impact on school.[2]

51. If partial or no response persists, it is important to revisit the diagnosis and assess treatment adherence, potential comorbidities, psychosocial complications and lifestyle issues.[2]

KEY POINTS
- ADHD is one of the most common mental health disorders in children and adolescents and > 50% persist into adulthood. Early diagnosis and treatment can improve outcomes.
- Evaluate children over age 4 presenting with suggestive symptoms for ADHD and other common comorbidities such as oppositional defiant disorder or anxiety.
- Screen adolescents with possible ADHD for comorbid substance use, mood and anxiety disorders and learning disabilities.
- A thorough history and the use of several rating scales can help gather supportive information (consider the use of the SNAP-IV 26- or 90-item version). Diagnosis, however, requires a more detailed assessment using the DSM-5 criteria.
- Non-pharmacologic treatments such as psychoeducation and parent behaviour management training should be offered to all patients.
- Psychostimulants are first-line pharmacologic treatments that can be offered to children over age 6 with significant impairment based on patient and family preference. Titrate dose to optimal balance of benefit and side effects.
- Routinely monitor those on stimulants for sleep, appetite, height/weight, BP and heart rate. Monitoring tools are available in the CADDRA toolkit https://www.caddra.ca/etoolkit-forms/.

CASE COMMENTARIES

Case 1: Max, age 6.5, and his mother Chelsea

What additional information would you like to know? What would you do in clinic today?

It would be helpful to ask about (Info point 11; Appendix 1):
- Family history of ADHD and other mental health disorders.
- Family dynamics.
- Birth and developmental history.
- Participation in activities (e.g., riding a bike) that pose a risk of injury.
- Diet—is it well balanced?
- Sleep history.
- Screen time.

It would be appropriate to check Max's height and weight, and do a general physical exam. This would also be an opportunity to observe Max's behaviour in the office.

Part Two

How would you address Chelsea's concern today?

It would be important to validate Chelsea's concerns and explain that it will likely take several office visits to complete a proper assessment of Max (Info point 11; Appendix 1).

This would be a good time to provide an ADHD rating scale (Info points 13, 14) for Chelsea, her husband and Max's teacher, along with a description of how to complete it. You could ask Chelsea to return when the scales are completed and suggest that she return on her own or with Darren if he is in town.

Part Three—One month later

What would be your next steps? How would you follow Max?

Based on the information gathered over several visits, you could make a diagnosis of ADHD using the DSM-5 (Info point 16; Appendices 1, 2).

Consider recommending behavioural training and parenting strategies (Info points 18, 19, 24, 25; Appendix 1), and books/websites to help Chelsea and Darren at home (Info point 20, 21; Handout: Online Resources). For further information, see PBSG module Behavioural Challenges in Parenting (Feb 2020) available at https://members.fmpe.org/. You could also provide the handout on ADHD: Myths and Facts (end of module).

Depending on the parents' preferences, you could also address medical management (Appendix 3)—medication type, immediate-release versus sustained-release, (Table 2; Info points 29–42), monitoring of medication side effects (Info points 45–47) and creation of a continued care plan. An assessment of cardiac risk may be appropriate if a decision is made to use stimulant medication now or in the future (Info point 35).

Re-administer the rating scale a few weeks after medication is started to monitor progress (Info point 13).

If medication is initiated, titrate the dose to optimal clinical effect or until Max experiences side effects. Consider the use of a monitoring tool (Info points 43, 44; Appendix 3). Review potential side effects and remind the parents that some physical side effects lessen or disappear over several days with regular dosing (Info point 45). If there is a partial or no response, initially try increasing the dose if tolerated, and then switching to another class of stimulants (Info points 49–51). Asking for another opinion (if available) would be helpful in this case. It would be best to make a medication switch when Max's family is on a long vacation or over the summer holidays to avoid any disruption to his schooling (Info point 50b).

REVIEWER COMMENT
If a 12-hour medication is wearing off after 6 hours, it is not the right dose and should be increased, rather than changing the medication. Another important point is the notion of rebound—as the stimulant wears off, the individual with ADHD may become irritable. If the dose is too low, this rebound may occur early in the day, making patients and families think the medication is not working when in fact the dose is too low and not providing adequate coverage.

How would you respond if Chelsea asked about testing Max's younger brother, Jack?

You could explain that assessment for ADHD is difficult in a child of Jack's age (Info point 8; Appendix 1) and suggest that she watch for early symptoms that might indicate ADHD (Info point 8). If Jack does develop concerning symptoms, you could recommend a parent training program in behaviour management (Info points 24, 25; Appendix 1).

Case 2: Megan, age 16, and her mother Tanya

What additional information would you like to know? What would you do in clinic today?

It would be helpful to know (Info point 11; Appendix 1):
- Medical history—e.g., medical, developmental, mental health.
- Marks in school—previous and current.
- Use of caffeinated beverages including energy drinks, pop.

- Sleep history—quantity and quality.
- Amount of screen time/social media.
- Extracurricular activities.
- Physical activity.
- Use of recreational drugs/alcohol.

It would be important to screen for any comorbidities—mood, anxiety and eating disorders (Info point 12; Box 2).

Part Two

What would be your next steps?

You might consider lab work to rule out anemia and thyroid disorders (Info point 15a). This would be a good time to provide an ADHD rating scale (Info points 13, 14) for Megan, Tanya and Megan's teachers (along with description of how to complete it) and ask them to return when done.

Part Three—One month later

How would you manage Megan?

It would be helpful for Megan to know that this condition will be part of her life going forward, that long-term, ongoing monitoring will be important, and that any comorbid conditions that develop must be managed (Info points 12, 17; Appendix 1). You could reassure Megan that this diagnosis will not prevent her from achieving her academic goals with appropriate supports. You could provide the Online Resources handout—links to the Centre for ADHD Awareness Canada on success in post-secondary education may be especially helpful for Megan over time.

Asking Megan and Tanya what type of management they would prefer would assist in formulating an approach going forward (Info point 17). You could discuss lifestyle modifications such as adequate sleep, regular physical activity, healthy eating, less caffeine and reduced screen time (Info points 21, 22; Appendix 1). The handout ADHD: Myths and Facts may be helpful for Megan and Tanya (Info points 20, 21). You could discuss some behavioural strategies for home and school, and advocate for appropriate educational accommodations (Box 4).

Given that Megan is at a potentially critical point in her education, you could consider offering medication at this point along with the behavioural changes above, depending on her and Tanya's preferences (Info points 29–51; Appendices 1, 3). Regardless of the decision, close follow-up and the use of another teacher assessment scale would be important to optimize her success.

We always welcome your input. If you would like to provide feedback on this module, the following link will take you to an electronic survey: **http://members.fmpe.org/modulefeedback.**

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While every care has been taken in compiling the information contained in this module, the Program cannot guarantee its applicability in specific clinical situations or with individual patients. Physicians and others should exercise their own independent judgment concerning patient care and treatment, based on the special circumstances of each case.

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Web-based resources cited within the module were active as of November 2020.

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QUICK STATISTICAL CONCEPT

Odds ratio (OR)
OR is the ratio of the odds of an event happening in an exposed group compared to the odds of it happening in an unexposed group. The odds of an event (outcome) is calculated as the number of those with the outcome compared to those who did not have the outcome. As an example: the risk of an outcome might be 25/100—the odds would be 25/75.

LEVELS OF EVIDENCE

Evidence Level	Type of Evidence Included
High Study conclusions are unlikely to be strongly affected by information from future studies.	• Systematic reviews/meta-analyses that include a wide range of well-designed studies (few limitations/risk of bias, directly applicable to target population, summary estimate has a narrow confidence interval). • Large, well-designed, multi-centre RCTs.
Moderate Study conclusions might be affected by additional information from future studies.	• Systematic reviews/meta-analyses of studies with more limitations/risk of bias (less well-designed RCTs, cohort, case control studies; summary estimate has a wide confidence interval). • Single, moderate-sized well-designed RCTs. • Well-designed, consistent, controlled but not randomized trials. • Large cohort studies.
Low Study conclusions could likely be affected by additional information from future studies.	• Small RCTs with a high risk of bias. • Controlled or cohort studies with significant limitations/risk of bias, significant variation between study results, or not directly applicable to target population.
Very Low Evidence from appropriately sized studies in representative populations is lacking or insufficient.	• Individual case reports or series. • One or more studies with very severe limitations/risk of bias.

In addition to the categorization above, when the body of evidence on a specific issue is limited, we may cite expert opinion as the highest evidence level (if available).

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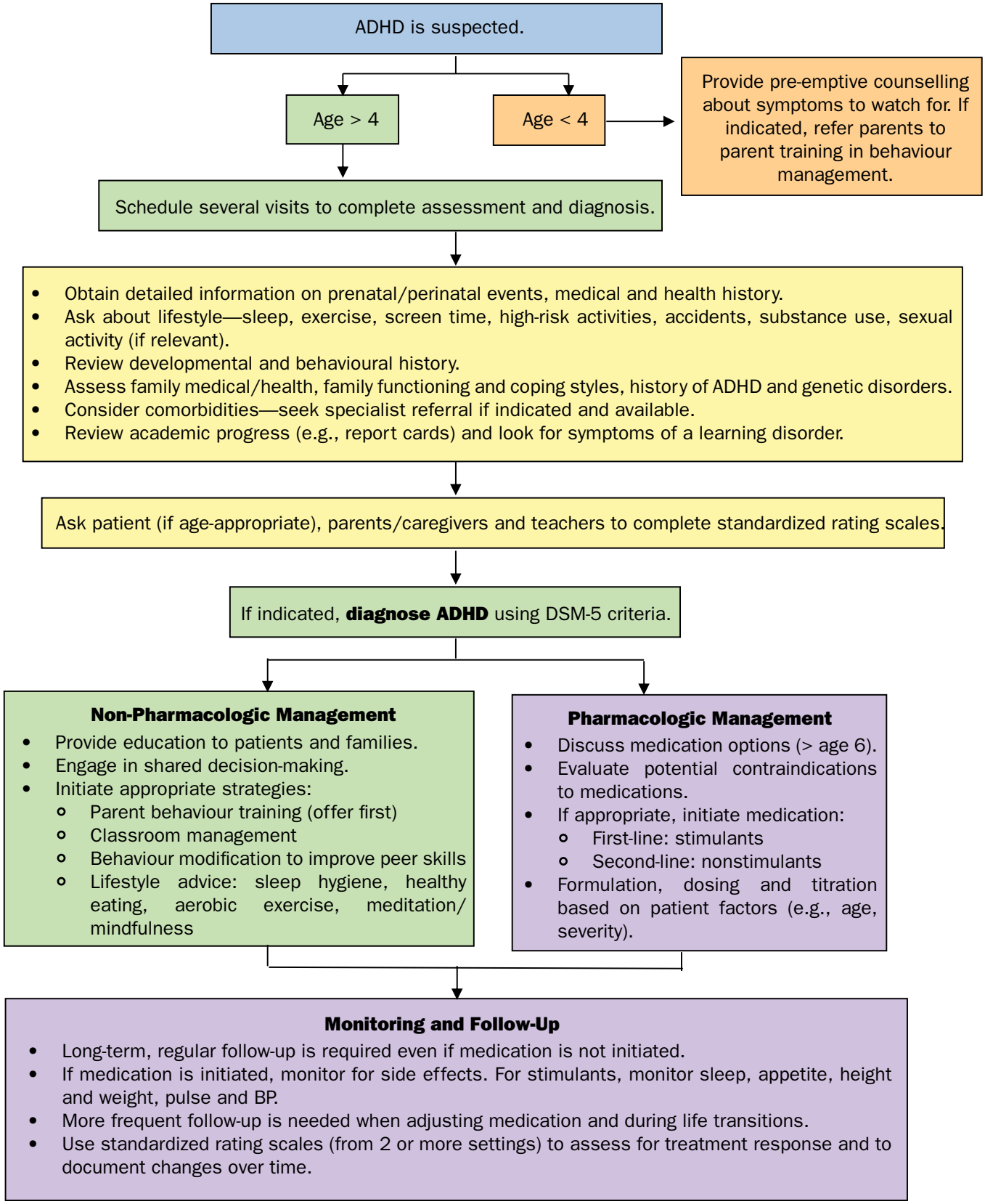
APPENDIX 1. Diagnosis and Management of ADHD



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APPENDIX 2. Attention-Deficit/Hyperactivity Disorder: DSM-5 Diagnostic Criteria

A. A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, as characterized by (1) and/or (2):

1) Inattention*:* Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

- **Note***:* The symptoms are not solely a manifestation of oppositional behavior, defiance, hostility, or failure to understand tasks or instructions. For older adolescents and adults (age 17 and older), at least five symptoms are required.
  a) Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities (e.g., overlooks or misses details, work is inaccurate).
  b) Often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations, or lengthy reading).
  c) Often does not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction).
  d) Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., starts tasks but quickly loses focus and is easily sidetracked).
  e) Often has difficulty organizing tasks and activities (e.g., difficulty managing sequential tasks; difficulty keeping materials and belongings in order; messy, disorganized work; has poor time management; fails to meet deadlines).
  f) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, reviewing lengthy papers).
  g) Often loses things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
  h) Is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts).
  i) Is often forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments).

2) Hyperactivity and impulsivity*:* Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

- **Note***:* The symptoms are not solely a manifestation of oppositional behavior, defiance, hostility, or a failure to understand tasks or instructions. For older adolescents and adults (age 17 and older), at least five symptoms are required.
  a) Often fidgets with or taps hands or feet or squirms in seat.
  b) Often leaves seat in situations when remaining seated is expected (e.g., leaves his or her place in the classroom, in the office or other workplace, or in other situations that require remaining in place).
  c) Often runs about or climbs in situations where it is inappropriate. (Note: In adolescents or adults, may be limited to feeling restless.)
  d) Often unable to play or engage in leisure activities quietly.
  e) Is often "on the go," acting as if "driven by a motor" (e.g., is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficult to keep up with).
  f) Often talks excessively.
  g) Often blurts out an answer before a question has been completed (e.g., completes people's sentences; cannot wait for turn in conversation).
  h) Often has difficulty waiting his or her turn (e.g., while waiting in line).
  i) Often interrupts or intrudes on others (e.g., butts into conversations, games, or activities; may start using other people's things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing).

A. Several inattentive or hyperactive-impulsive symptoms were present prior to age 12 years.
B. Several inattentive or hyperactive-impulsive symptoms are present in two or more settings (e.g., at home, school, or work; with friends or relatives; in other activities).
C. There is clear evidence that the symptoms interfere with, or reduce the quality of, social, academic, or occupational functioning.
D. The symptoms do not occur exclusively during the course of schizophrenia or another psychotic disorder and are not better explained by another mental disorder (e.g., mood disorder, anxiety disorder, dissociative disorder, personality disorder, substance intoxication or withdrawal).

Specify whether:

- *314.01 (F90.2)* **Combined presentation***:* If both Criterion A1 (inattention) and Criterion A2 (hyperactivity-impulsivity) are met for the past 6 months.
- *314.00 (F90.0)* **Predominantly inattentive presentation***:* If Criterion A1 (inattention) is met but Criterion A2 (hyperactivity-impulsivity) is not met for the past 6 months.
- *314.01 (F90.1)* **Predominantly hyperactive/impulsive presentation***:* If Criterion A2 (hyperactivity-impulsivity) is met and Criterion A1 (inattention) is not met for the past 6 months.

Specify if:

- **In partial remission***:* When full criteria were previously met, fewer than the full criteria have been met for the past 6 months, and the symptoms still result in impairment in social, academic, or occupational functioning.

Specify current severity:

- **Mild***:* Few, if any, symptoms in excess of those required to make the diagnosis are present, and symptoms result in no more than minor impairments in social or occupational functioning.
- **Moderate***:* Symptoms or functional impairment between "mild" and "severe" are present.
- **Severe***:* Many symptoms in excess of those required to make the diagnosis, or several symptoms that are particularly severe, are present, or the symptoms result in marked impairment in social or occupational functioning.

APPENDIX 3. Medications For ADHD

Canadian Medication Tables per Age Group

Table 5.10 Medical Treatment for ADHD – Children (6-12 Years)

Brand Name	Active Ingredient	Dosage Form	Starting Dose[1]	Titration Schedule [2]		Total Maximum Daily Dose[3]	
				Product Monograph	CADDRA[4]	Product Monograph	CADDRA[4]
FIRST LINE AGENTS - Long-acting psychostimulants							
Adderall XR®[5]	amphetamine mixed salts	5, 10, 15, 20, 25, 30 mg cap	5-10 mg q.d. a.m.	↑ 5-10 mg	↑ 5 mg	30 mg	30 mg
Biphentin®	methylphenidate	10, 15, 20, 30, 40, 50, 60, 80 mg cap	10-20 mg q.d. a.m.	↑ 10 mg	↑ 5-10 mg	60 mg	60 mg
Concerta®[5]	methylphenidate	18, 27, 36, 54 mg tab	18 mg q.d. a.m.	↑ 18 mg	↑ 9-18 mg	54 mg	72 mg
Foquest®	methylphenidate	25, 35, 45, 55, 70 mg cap	25 mg q.d. a.m.	↑ 10-15 mg	↑ 10-15 mg	70 mg	70 mg
Vyvanse®	lisdexamfetamine	10, 20, 30, 40, 50, 60, 70[6] mg cap 10, 20, 30, 50, 50, 60 mg chewable tab	20-30 mg q.d. a.m.	↑ 10-20 mg	↑ 10-20 mg	60 mg	60 mg
SECOND LINE / ADJUNCTIVE AGENTS - Short-acting and intermediate-acting psychostimulants ***Indications for use: a) p.r.n. for certain activities; b) to augment[7] long-acting formulations early or late in the day, or early in the evening and c) when long-acting agents are cost prohibitive***							
Dexedrine®[5]	dextro-amphetamine	5 mg tablet	2.5-5 mg b.i.d.[8]	↑ 2.5-5 mg	↑ 2.5-5 mg	40 mg	20 mg
Dexedrine® Spansule®[9]	dextro-amphetamine	10, 15 mg capsule	10 mg q.d. a.m.	↑ 5 mg	↑ 2.5-5 mg	40 mg	30 mg
Ritalin®[5]	methylphenidate	10, 20 mg tablet (5 mg generic only)	5 mg b.i.d. to t.i.d.[8]	↑ 5-10 mg	↑ 5 mg	60 mg	60 mg
Ritalin® SR[10,5]	methylphenidate	20 mg tablet	20 mg q.d. a.m.	↑ 20 mg	↑ 20 mg	60 mg	60 mg
SECOND LINE / ADJUNCTIVE AGENTS - Long acting non-psychostimulants Selective Alpha$_{2A}$-adrenergic receptor agonist ***Indications for use: Monotherapy and as an adjunctive therapy to psychostimulants***							
Intuniv XR®	guanfacine	1, 2, 3, 4 mg tablet	1 mg	Increments of 1 mg every 7-14 days		4 mg	4 mg
SECOND LINE / ADJUNCTIVE AGENTS - Long-acting non-psychostimulants **Selective norepinephrine reuptake inhibitor** ***Indications for use: Monotherapy (off-label: prescribed as an adjunctive therapy)***							
Strattera®[5]	atomoxetine	10, 18, 25, 40, 60, 80, 100 mg capsule	0.5 mg/kg/day	Adjust dosage every 7-14 days; to 0.8 mg/kg/day, then 1.2 mg/kg/day		Lesser of 1.4 mg/kg/day or 60 mg/day	

p.r.n. = as needed

[1] CADDRA generally recommends starting at the lowest dose available. Young children should be titrated slowly, e.g. Concerta: 18, 27, 36; Biphentin 10, 15, 20 mg; and Foquest 25, 35, 45 mg

[2] Most research protocols and product monographs advise on intervals no less than 7 days; longer intervals may be needed for particular clinical or tolerability situations

[3] Refer to the adolescent table for children > 40 kg

[4] A consensus decision was made based on clinical use and research data. Doses per CADDRA that are over or under product monograph maximum or minimum doses should be considered off-label use

[5] Generic available. The Canadian ADHD Practice Guidelines' committee reported loss of symptom control in some patients when switched from original to generic drugs. Therefore, long-acting psychostimulant generics are considered second line agents

[6] Vyvanse® 70mg is an off label dosage for ADHD treatment in Canada

[7] To augment Adderall XR® or Vyvanse®, short-acting and intermediate-acting dextro-amphetamine products can be used. To augment Biphentin® or Concerta® short-acting methylphenidate products can be used

[8] b.i.d. refers to qam and qnoon and t.i.d. refers to qa.m., qnoon and q4p.m.

[9] Dexedrine® Spansule® may last 6-8 hours

[10] Ritalin® SR may help cover the noon period but clinical experience suggests an effect similar to short-acting preparations. An increased dose could be spread out to include q2pm dose with a daily maximum of 60 mg

Note: These tables summarize key information and cannot be considered exhaustive. Physicians should refer to Product Monographs for complete prescribing information.

APPENDIX 3. Medications For ADHD cont'd

Table 5.11 – Medical Treatment for ADHD – Adolescents (13-17 Years)[1]

Brand Name	Active Ingredient	Dosage Form	Starting Dose[2]	Titration Schedule[3]		Total Maximum Daily Dose	
				Product Monograph	CADDRA[4]	Product Monograph	CADDRA[4]
FIRST LINE AGENTS - Long-acting psychostimulants							
Adderall XR®[5]	amphetamine mixed salts	5, 10, 15, 20, 25, 30 mg cap	5-10 mg q.d. a.m.	↑ 5-10 mg	↑ 5 mg	20-30 mg	50 mg
Biphentin®	methylphenidate	10, 15, 20, 30, 40, 50, 60, 80 mg cap	10-20 mg q.d. a.m.	↑ 10 mg	↑ 5-10 mg	60 mg	80 mg
Concerta®[5]	methylphenidate	18, 27, 36, 54 mg tab	18 mg q.d. a.m.	↑ 18 mg	↑ 9-18 mg	54 mg	90 mg
Foquest®	methylphenidate	25, 35, 45, 55, 70 mg cap	25 mg q.d. a.m.	↑ 10 or 15 mg	↑ 10 or 15 mg	70 mg	70 mg
Vyvanse®	lisdexamfetamine	10, 20, 30, 40, 50, 60, 70[6] mg cap 10, 20, 30, 40, 50, 60 mg chewable tab	20-30 mg q.d. a.m.	By clinical discretion	↑ 10 mg	60 mg	70 mg
SECOND LINE / ADJUNCTIVE AGENTS - Short-acting and intermediate-acting psychostimulants **Indications for use: a) p.r.n. for certain activities; b) to augment[7] long-acting formulations early or late in the day, or early in the evening and c) when long-acting agents are cost prohibitive**							
Dexedrine®[5]	dextro-amphetamine	5 mg tab	2.5-5 mg b.i.d.[8]	↑ 5 mg	↑ 2.5-5 mg	40 mg	30 mg
Dexedrine® Spansule®[9]	dextro-amphetamine	10, 15 mg cap	10 mg q.d. a.m.	↑ 5 mg	↑ 2.5-5 mg	40 mg	30 mg
Ritalin®[5]	methylphenidate	10, 20 mg tab (5 mg generic only)	5 mg b.i.d. to t.i.d.[8]	↑ 5-10 mg	↑ 5 mg	60 mg	60 mg
Ritalin® SR[10,5]	methylphenidate	20 mg tab	20 mg q.d. a.m.	↑ 20 mg (add q2pm dose)		60 mg	80 mg
SECOND LINE / ADJUNCTIVE AGENTS - Long-acting non-psychostimulants Selective Alpha$_{2A}$-adrenergic receptor agonist ***Indications for use: Monotherapy and as an adjunctive therapy to psychostimulants***							
Intuniv XR®	guanfacine	1, 2, 3, 4 mg tab	1 mg	Increments of 1 mg every 7 to 14 days		7 mg for monotherapy and 4 mg for adjunctive therapy	
SECOND LINE / ADJUNCTIVE AGENTS - Long-acting non-psychostimulants - Selective norepinephrine reuptake inhibitor ***Indications for use: Monotherapy (off-label: prescribed as an adjunctive therapy)***							
Strattera®[5]	atomoxetine	10, 18, 25, 40, 60, 80, 100 mg cap	0.5 mg/kg/day	Adjust dosage every 7-14 days; to 0.8 mg/kg/day, then 1.2 mg/kg/day[11]		Lesser of 1.4 mg/kg/day or 100 mg/day	

p.r.n. = as needed

[1] For adolescents > 40 kg

[2] CADDRA generally recommends starting at the lowest dose available

[3] Most research protocols and product monographs advise on intervals no less than 7 days; longer intervals may be needed for particular clinical or tolerability situations

[4] A consensus decision has been made based on clinical use and research data. Doses per CADDRA that are over or under product monograph maximum or minimum doses should be considered off-label use

[5] Generic available. The Canadian ADHD Practice Guidelines' committee reported loss of symptom control in some patients when switched from original to generic drugs. Therefore, long-acting psychostimulant generics are considered second line agents

[6] Vyvanse® 70mg is an off label dosage for ADHD treatment in Canada

[7] To augment Adderall XR® or Vyvanse®, short-acting and intermediate-acting dextro-amphetamine products can be used. To augment Biphentin® or Concerta® short-acting methylphenidate products can be used

[8] b.i.d. refers to qam and qnoon and t.i.d. refers to qa.m., qnoon and q4p.m.

[9] Dexedrine® Spansule® may last 6-8 hours

[10] Ritalin® SR may help cover the noon period but clinical experience suggests an effect similar to short-acting preparations

[11] This titration schedule applies to adolescents < 70 kg. For adolescents > 70 kg, use the adult titration schedule

Note: These tables summarize key information and cannot be considered exhaustive. Physicians should refer to Product Monographs for complete prescribing information.

ONLINE RESOURCES

Centre for ADHD Awareness Canada www.caddac.ca
This Canadian national not-for-profit organization is dedicated to improving the lives of those with ADHD through awareness, education and advocacy. It offers up-to-date, scientifically-based information on ADHD, and provides a comprehensive list of resources for children/teens and families including support groups, recreation programs, tutors, schools and camps. It also provides resources for those moving to—or currently in—post-secondary education. For example, "10 Ways to Achieve Success for University or College Students with ADHD" is available at:
www.caddac.ca/cms/CADDAC_pdf/Campaign/10WaystoAchieveSuccessLong.pdf

CHADD Canada www.chaddcanada.com
CHADD Canada is a charitable organization that aims to help support, educate and improve the lives of those with ADHD and their families/caregivers. It has chapters in communities across Canada, where support meetings are held regularly. It also sponsors workshops, presentations and conferences in an effort to share the latest breakthroughs and techniques in dealing with ADHD.

About Kids Health www.aboutkidshealth.ca/mentalhealth
This learning hub for parents/caregivers includes information about the signs and symptoms of ADHD, diagnosis and treatment, and strategies to address school concerns.

How to ADHD (YouTube*)*
https://www.youtube.com/playlist?list=PLvq9Tp5JZ8oAV-GAZmvEoYj9ntBaabKMj
This series of short (5- to 10-minute) entertaining videos for adolescents and parents explains many concepts and gives tips on how to manage ADHD.

November 2020

PATIENT/PARENT HANDOUT

ADHD: MYTHS AND FACTS

Myth	Fact
ADHD is not real	ADHD is a real condition of the nervous system. It can cause problems with paying attention, being too active (hyper) and/or being too impulsive (doing things without thinking ahead) in ways that aren't suitable for the child's age.
You can't have ADHD if you're doing well in school	Even children who do well in school may have ADHD.
Poor teaching or poor parenting causes ADHD	Teaching or parenting doesn't cause ADHD (it mostly runs in families). But good quality teaching and parenting can help improve problems for a child with ADHD.
What a child eats (e.g., refined sugar, food additives) causes ADHD	A connection between ADHD and diet has not been proven. A good diet and general health are always important.
ADHD only affects boys	ADHD is more often identified in boys, but it can happen in girls too. Inattentive-type ADHD is more common in girls, while disruptive, impulsive behaviour is more common in boys. Girls with ADHD often have more distress, anxiety and depression compared to boys with ADHD.
There is a test that can diagnose ADHD	There's no test to diagnose ADHD. It's diagnosed by a health care provider after they've looked at a child's symptoms and medical history.
ADHD is diagnosed too often	An increase in children diagnosed with ADHD could be due to a number of reasons: • Parents and health care providers are more aware of it. • Health care providers ask about it more often. • Better treatments are available.
All children with ADHD have disruptive behaviours	Only about half of children with ADHD have problems with behaving in a destructive way.
Children with ADHD can never pay attention or complete their work	Sometimes children with ADHD can focus well on stimulating activities (like video games or creative activities such as Lego or drawing) but have problems focusing on other tasks.
All children with ADHD are hyperactive	Not all children with ADHD are hyperactive. In fact, some may seem overly quiet and lack energy.
Children with ADHD are lazy	Everyone finds it easier to focus on and complete an activity that they find interesting. Many children with ADHD can focus well on some activities (as noted above).
Medication alone can manage ADHD	Medication can improve ADHD. But the best approach also includes other measures like education about ADHD, behavioural treatments and supports in school.
Everybody can be inattentive sometimes	Everyone can experience a symptom of ADHD, like forgetting items. But children with ADHD have many more symptoms and many more problems as a result of them.

Adapted with permission from the Canadian ADHD Resource Alliance (CADDRA). Canadian ADHD Practice Guidelines, 4.1 Edition. 2020. www.caddra.ca

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