ADHD

ADHD Inattentive Critera

- Inattention: Six or more symptoms of inattention for children up to age 16 years, or five or more for adolescents age 17 years and older and adults; symptoms of inattention have been present for at least 6 months, and they are inappropriate for developmental level: ◦Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or with other activities.
- ◦Often has trouble holding attention on tasks or play activities.
- ◦Often does not seem to listen when spoken to directly.
- ◦Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., loses focus, side-tracked).
- ◦Often has trouble organizing tasks and activities.
- ◦Often avoids, dislikes, or is reluctant to do tasks that require mental effort over a long period of time (such as schoolwork or homework).
- ◦Often loses things necessary for tasks and activities (e.g. school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
- ◦Is often easily distracted
- ◦Is often forgetful in daily activities.

ADHD Hyperactive/Impulsive Criteria

- 2.Hyperactivity and Impulsivity: Six or more symptoms of hyperactivity-impulsivity for children up to age 16 years, or five or more for adolescents age 17 years and older and adults; symptoms of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for the person's developmental level:
  - ◦Often fidgets with or taps hands or feet, or squirms in seat.
- ◦Often leaves seat in situations when remaining seated is expected.
- ◦Often runs about or climbs in situations where it is not appropriate (adolescents or adults may be limited to feeling restless).
- ◦Often unable to play or take part in leisure activities quietly.
- ◦Is often "on the go" acting as if "driven by a motor".
- ◦Often talks excessively.
- ◦Often blurts out an answer before a question has been completed.
- ◦Often has trouble waiting their turn.
- ◦Often interrupts or intrudes on others (e.g., butts into conversations or games)

- In addition, the following conditions must be met:
- •Several inattentive or hyperactive-impulsive symptoms were present before age 12 years.
- •Several symptoms are present in two or more settings, (such as at home, school or work; with friends or relatives; in other activities).
- •There is clear evidence that the symptoms interfere with, or reduce the quality of, social, school, or work functioning.
- •The symptoms are not better explained by another mental disorder (such as a mood disorder, anxiety disorder, dissociative disorder, or a personality disorder). The symptoms do not happen only during the course of schizophrenia or another psychotic disorder.

Differential for ADHD

Medical conditions include

- hearing impairment,
- thyroid disease,
- lead toxicity,
- hepatic disease,
- sleep apnea, and
- drug interactions.

Substances

- steroids,
- antihistamines,
- anticonvulsants,
- caffeine, and
- nicotine, may have adverse effects that impact attentiveness.

Differential Diagnosis for ADHD

Psychiatric conditions

- Oppositional Defiant Disorder (50% comorbid)
- Anxiety (30% comorbid)
- Mood (30% comorbid)
- obsessive-compulsive disorder
- substance use,
- Trauma/PTSD,
- borderline personality, and
- learning disorders (25%)
- intellectual disability

Diagnosing ADHD

- History from Parents/teacher/child
- Medical and Family History. Medication List
- If history negative/unremarkable no labs noted
- Early or unexplained death in family – consider EKG
- Consider lead level depending on exposure/risk
- No psychological or neuropsychological testing unless cognitive or learning concerns

How To Diagnose

- Vanderbilt (6 to adult)
  - Parent form
  - Teacher Form
  - Diagnosis and Followup for ADHD
  - Screen for ODD, Conduct and Anxiety/Depression

ADHD IV – preschool version (3-5)

Nonpharmacological interventions for ADHD

Intervention	Evidence	Context for use
Psychoeducation	An RCT comparing a structured psychoeducational intervention with a support group for parents of children and youth with ADHD showed improvements in parent-reported symptoms, with additional benefits in prosocial behaviour after 1 year (9).	When initiating treatment, providing accurate education and information to patients and families are essential for successful management planning and implementation. Misperceptions are common. Many patients and families rely on both online and physician-recommended resources for information (10).
Shared decision-making	A 6-month longitudinal cohort showed that parents who focused on academic improvements were more likely to initiate medication, while those more concerned with behaviour were likelier to begin behavioural therapy (12).	In shared decision-making, all participants (parents, youth/child, and physician) share information regarding diagnosis and treatment before the latter is implemented. Treatment planning is enhanced by identifying goals for improvement (1): academic performance (2), behavioural compliance (3), interpersonal relationships (11).
PBT	Meta-analytic examination of RCTs of PBT using observations and teacher ratings showed improved parenting skills for conduct problems. Parent ratings showed effectiveness for ADHD symptoms, social skills and academic performance (95).	For preschool age children, PBT should be the intervention of first choice (4). For disruptive behaviours comorbid with ADHD, initiating PBT before medication proved more effective than medication followed by PBT (96).
Classroom management	Classroom behaviour management strategies have been considered a well-established treatment for ADHD for over a decade (97).	Teachers help children with special needs by setting classroom rules and expectations, providing students with individual attention and praise, and offering both direct and indirect messages of acceptance.
Daily report card	An RCT of daily report cards and psychological consultation showed improved compliance with classroom rules, academic productivity and classroom behaviours (98).	Behaviour management strategies that include parent and teacher cooperation have been shown to improve homework completion (98).
Behavioural peer interventions	RCTs of two such programs (different researchers) observed improved peer skills in classroom settings; therefore, the intervention is considered well established (99).	Adults use behaviour modification techniques to help children improve peer skills in recreational settings, such as summer camps (99).
Social skills training	No clear evidence of efficacy for improved classroom behaviour or peer interaction skills (5).	
Organizational skills training	RCTs of two such programs (different researchers) showed improvements in organization, time management and planning; therefore, the intervention is considered well established (100).	These programs address specific executive functioning difficulties common in children with ADHD. They are added to other interventions (100).
Cognitive training	Meta-analysis showed benefit for working memory skills targeted by computerized interventions. Parents, but not teachers, reported improved inattention symptoms (101).	Computerized interventions for specific neuropsychological deficits (e.g., working memory) require additional development before they can be considered clinically useful (102).
EEG neurofeedback	Systematic reviews showed benefit reported by parents; benefit from blinded outcomes was less clear (103).	Such interventions require additional development before they can be considered clinically useful (104).
Diet	Small effects on ADHD symptoms were shown for free fatty acid supplementation and restricted elimination diets (e.g., removing artificial food dyes) (6,105).	Children with a suspected dietary deficiency, insufficiency or food allergy should be evaluated (106).
Exercise	Meta-analysis of exercise interventions (e.g., short-term aerobic exercise and yoga) showed improvement in core ADHD symptoms and in related anxiety and cognitive functions (107).	Exercise provides additional benefits to health and well-being (108).

Pediatrics and Child Health. "ADHD in Children and Youth: Part 2- Treatment. Volume 23. Issue 7. Nov 2018. 462-472.

CHADD

Medications Used in the Treatment of ADHD
Approved by the US FDA

National Resource Center on ADHD
A Program of CHADD

Methylphenidate-based Stimulants

Follow the link on the medication name for its medication guide and generic information if available.

Delivery	Brand Name	Duration	Form	Available Dosage Strengths	Concerns & Side Effects
Immediate release	**Focalin®** *(generic available)*	3–5 hours	tablet	2.5 mg 5 mg 10 mg	Common side effects include: • headache • decreased appetite • stomach ache • nervousness • trouble sleeping • nausea • reduced spontaneity Other side effects may include: • slowing of growth (height and weight) in children • eyesight changes or blurred vision • painful and prolonged erections Heart-related problems: • sudden death in patients who have heart problems or heart defects • stroke and heart attack in adults • increased blood pressure and heart rate Mental (psychiatric) problems: • new or worse behavior and thought problems • new or worse bipolar illness • new or worse aggressive behavior or hostility • new psychotic symptoms (such as hearing voices, believing things that are not true, suspiciousness) or new manic symptoms Circulation problems in fingers and toes
	Methylin® Oral Solution *(generic available)*	3–5 hours	liquid	5 mg/5ml 10 mg/5ml	
	Methylin® Chewable	3-5 hours	chewable tablet	2.5 mg 5 mg 10 mg	
	Ritalin® *(generic available)*	3–5 hours	tablet	5 mg 10 mg 20 mg	
Sustained release	**Ritalin-SR®**	7–8 hours	tablet	20 mg	
Extended release	**Adhansia XR™**	12+ hours	capsule	25 mg 35 mg 45 mg 55 mg 70 mg 85 mg	
	Aptensio XR™ *(generic available)*	7–8 hours	capsule	10 mg 15 mg 20 mg 30 mg 40 mg 50 mg 60 mg	
	Concerta® *(generic available)*	10–12 hours	tablet	18 mg 27 mg 36 mg 54 mg	
	Cotempla™XR-ODT	8–12 hours	tablet	8.6 mg 17.3 mg 25.9 mg	
	Daytrana®	10–12 hours (9 hours applied + up to three hours after)	transdermal patch	10 mg 15 mg 20mg 30mg	
	Focalin XR® *(generic available)*	12 hours	capsule	5 mg 10 mg 15 mg 20 mg 25 mg 30 mg 35 mg 40 mg	
	Jornay PM™	12+ hours	capsule	20 mg 60 mg 40 mg 80 mg 100 mg	

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Delivery	Brand Name	Duration	Form	Available Dosage Strengths	Concerns & Side Effects
	Metadate CD® *(generic available)*	8 hours	capsule	10 mg 20 mg 30 mg 40 mg 50 mg 60 mg	
	Metadate® ER	8–12 hours	tablet	20 mg	
	QuilliChew ER™	8–12 hours	chewable tablet	20 mg 30 mg 40 mg	
	Quillivant XR®	8, 10, and 12 hours	liquid	10 mg/2ml 20 mg/4ml 30 mg/6ml 40 mg/8 ml 50 mg/10 ml 60 mg/12 ml	
	Ritalin LA® *(generic available)*	8 hours	capsule	10 mg 20 mg 30 mg 40 mg 60 mg	

Amphetamine-based Stimulants

Follow the link on the medication name for its medication guide and generic information if available.

Delivery	Brand Name	Duration	Form	Available Dosage Strengths	Concerns & Side Effects
Immediate release	**Adderall ®** *(generic available)*	4–8 hours	tablet	5 mg 7.5 mg 10 mg 12.5 mg 15 mg 20 mg 30 mg	Common side effects include: • headache • trouble sleeping • circulation problems in fingers and toes • decreased appetite • nervousness • dizziness • diarrhea, constipation • mood changes, feeling irritable, restless or nervous • dry mouth, unusual or unpleasant taste in mouth • runny nose, nosebleeds • itching, rash, or allergic reactions • increased tics • reduced spontaneity
	Evekeo®	4–6 hours	tablet	5 mg 10 mg	
	Evekeo ODT ™	4–6 hours	tablet	5 mg 10 mg 15 mg 20 mg	
	ProCentra®	4-8 hours	liquid	5mg/5ml	
	Zenzedi®	4–8 hours	tablet	2.5 mg 5 mg 7.5 mg 10 mg 15 mg 20 mg 30 mg	

Medications Used in the Treatment of ADHD
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Delivery	Brand Name	Duration	Form	Available Dosage Strengths	Concerns & Side Effects
Extended release	**Adderall XR®** *(generic available)*	8–12 hours	capsule	5 mg 10 mg 15 mg 20 mg 25 mg 30 mg	Other side effects may include: • slowing of growth (height and weight) in children • eyesight changes or blurred vision • impotence or sexual problems Heart-related problems: • sudden death in patients who have heart problems or heart defects • stroke and heart attack in adults • increased blood pressure and heart rate Mental (psychiatric) problems: • new or worse behavior and thought problems • new or worse bipolar illness • new or worse aggressive behavior or hostility • new psychotic symptoms (such as hearing voices, believing things that are not true, suspiciousness) or new manic symptoms
	Adzenys ER		liquid	3.1 mg/2.5 ml 6.3 mg/5 ml 9.4 mg/7.5 ml 12.5 mg/10 ml 15.7 mg/12.5 ml 18.8 mg/15 ml	
	Adzenys XR-ODT™	9–10 hours—children 11 hours—adults	tablet	3.1 mg 6.3 mg 9.4 mg 12.5 mg 15.7 mg 18.8 mg	
	Dexedrine® *(generic available)*	6–9 hours	capsule	5 mg 10 mg 15 mg	
	Desoxyn®	4-8 hours	tablet	5 mg	
	Dyanavel® XR	8–12 hours	liquid	2.5 mg/1 ml 5 mg/2 ml 7.5 mg/3 ml 10 mg/4 ml 12.5 mg/5 ml 15 mg/6 ml 17.5 mg/7 ml 20 mg/8 ml	
	Mydayis™	16 hours	capsule	12.5 mg 25 mg 37.5 mg 50 mg	
	Vyvanse®	10–12 hours	capsule	10 mg 20 mg 30 mg 40 mg 50 mg 60 mg 70 mg	
	Vyvanse®	8-12 hours	chewable tablet	10 mg 20 mg 30 mg 40 mg 50 mg 60 mg	

Medications Used in the Treatment of ADHD
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Non-Stimulant Medications
Follow the link on the medication name for its medication guide and generic information if available.

Norepinephrine reuptake inhibitor

Medication	Brand Name	Delivery	Duration	Form	Available Dosage Strengths	Concerns & Side Effects
Atomoxetine	**Strattera®** *(generic available)*	Extended release	24 hours	capsule	10 mg 18 mg 25 mg 40 mg 60 mg 80 mg 100 mg	Nervousness, sleep problems, fatigue, upset stomach, dizziness, dry mouth. In rare cases, may lead to severe liver injury or possibly to suicidal thoughts.

Alpha agonists

Medication	Brand Name	Delivery	Duration	Form	Available Dosage Strengths	Concerns & Side Effects
Clonidine	**Kapvay®** *(generic available)*	Extended release	12–24 hours	tablet	0.1 mg 0.2 mg	Fatigue, drowsiness, dizziness, dry mouth, decreased appetite, increased appetite, constipation, irritability, low blood pressure; abrupt discontinuation may lead to elevated levels of nervousness, anxiety, and blood pressure
Guanfacine	**Intuniv®** *(generic available)*	Extended release	12–24 hours	tablet	1 mg 2 mg 3 mg 4 mg	

The lists of side effects are provided by the Food and Drug Administration (FDA) and are not a complete list of all possible side effects. If you are experiencing unusual symptoms, consult your doctor or prescribing health care provider. Follow links for more information.

Additional Resources:
- DAILYMED (U.S. National Library of Medicine)
- Drug Lookup (American Academy of Pediatrics)
- Medication Guides (US Food & Drug Administration)
- FDA Listing of Authorized Generics (as of July 1, 2019)
- ADHD Medication Guide (Cohen Children's Medical Center, March 2019)

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Methylphenidate

- Short-acting immediate release: Chewable tablets, Methylin (oral solution), and Ritalin (tablets): Oral: Initial: 10 to 20 mg/day in 2 divided doses before breakfast and lunch; may increase based on response and tolerability in 5 to 10 mg increments at weekly or greater intervals up to a maximum dose of 60 mg/day in 2 to 3 divided doses (Steingard 2019).

Intermediate-acting extended release:

- Metadate ER (tablets): Oral: Initial: 10 mg twice daily; may increase dose based on response and tolerability in 10 mg increments at weekly or greater intervals up to a maximum dose of 60 mg/day. Some experts suggest a further increase up to 100 mg/day may be necessary in some patients for optimal response (BAP [Bolea-Alamañac 2014b]; Bukstein 2019; Huss 2017).
- Ritalin SR (tablets) [Canadian product]: Oral: Initial: 20 mg once daily in the morning; may increase dose based on response and tolerability in 10 mg increments at weekly or greater intervals up to a maximum dose of 60 mg/day. Some experts suggest a further increase up to 100 mg/day may be necessary in some patients for optimal response (BAP [Bolea-Alamañac 2014b]; Bukstein 2019; Huss 2017).

Long-acting extended release and transdermal:

- Adhansia XR (capsules): Oral: Initial: 25 mg once daily in the morning; may increase dose based on response and tolerability in 10 to 15 mg increments at intervals of ≥5 days up to a maximum dose of 100 mg/day. Doses >85 mg are associated with higher rate of side effects.
  - Conversion from IR methylphenidate to Adhansia XR: Discontinue previous formulation and titrate using above schedule; do not substitute on a mg-per-mg basis.
- Aptensio XR (capsules): Oral: Initial: 10 mg once daily in the morning; may increase dose based on response and tolerability in 10 mg increments at weekly or greater intervals up to a maximum dose of 60 mg/day.
  - Conversion from other methylphenidate products to Aptensio XR: There are no conversion recommendations in the manufacturer's labeling.
- Concerta (tablets): Oral: Initial: 18 to 36 mg once daily in the morning; may increase dose based on response and tolerability in increments of 18 mg at weekly or greater intervals up to a maximum dose of 72 mg/day.

Concerta Dosing Conversion

IR methylphenidate (current dose)	Intermediate-acting ER methylphenidate (Metadate ER, Ritalin SR [Canadian product]) (current dose)[a]	Concerta initial dose
5 mg 2 to 3 times daily	20 mg daily	18 mg once daily in the morning
10 mg 2 to 3 times daily	40 mg daily	36 mg once daily in the morning
15 mg 2 to 3 times daily	60 mg daily	54 mg once daily in the morning
20 mg 2 to 3 times daily	--	72 mg once daily in the morning

[a]Concerta Canadian product labeling.

- Daytrana transdermal patch: Topical: Initial: 10 mg patch once daily; apply to hip 2 hours before effect is needed and remove 9 hours after application (eg, 3 hours before bedtime); may increase dose based on response and tolerability to the next transdermal patch dosage at intervals of ≥1 week up to 30 mg/day (Marchant 2011; McRae-Clark 2011). Some patients may require up to 60 mg/day for optimal response (Bukstein 2019; Huss 2017). Patch may be removed before 9 hours if a shorter duration of action is required or if late-day adverse effects appear, or it may be worn for up to 16 hours if extended duration of effects is needed (Arnold 2007). Plasma concentrations usually start to decline when the patch is removed but drug absorption may continue for several hours after patch removal.

- Conversion from IR methylphenidate or from Concerta (long-acting extended release) to the transdermal patch: Discontinue previous formulation and titrate using above schedule; do not substitute on a mg-per-mg basis per manufacturer's labeling. Alternatively, some clinicians support higher starting patch doses for patients converting from oral methylphenidate doses of >20 mg/day. Approximate equivalent doses, with a 9-hour patch wear time, are as follows below (Arnold 2007):

- Transdermal Dosing Conversion

Transdermal Dosing Conversion

Immediate release (mg/day)	Concerta (mg/day)	Patch size (Daytrana)
15	18	10 mg (12.5 cm^2)
22.5	27	15 mg (18.75 cm^2)
30	36	20 mg (25 cm^2)
45	54	30 mg (37.5 cm^2)

- Jornay PM (capsules): Oral: Initial: 20 mg once daily in the evening between 6:30 PM and 9:30 PM (eg, 8:00 PM); may increase dose based on response and tolerability in increments of 20 mg at weekly or greater intervals up to a maximum dose of 100 mg/day.
  - Conversion from IR methylphenidate to Jornay PM: Discontinue previous formulation and titrate using above schedule; do not substitute on a mg-per-mg basis.

- Metadate CD (capsules), QuilliChew ER (chewable tablets), Quillivant XR (oral suspension): Oral: Initial: 20 mg once daily in the morning; may increase dose based on response and tolerability in 10 to 20 mg increments at weekly or greater intervals up to a maximum dose of 60 mg/day. Some experts suggest a further increase up to 100 mg/day with Metadate CD may be necessary in some patients for optimal response (BAP [Bolea-Alamañac 2014b]; Bukstein 2019). Note: QuilliChew ER tablets are scored and may be broken in half for 10 mg and 15 mg doses.
  - Conversion from IR, intermediate-acting ER, or long-acting ER methylphenidate to QuilliChew ER or Quillivant XR: Discontinue previous formulation and titrate using above schedule; do not substitute on a mg-per-mg basis. There are no conversion recommendations in the manufacturer's labeling for Metadate CD.

- Ritalin LA (capsules): Oral: Initial: 10 to 20 mg once daily in the morning; may increase dose based on response and tolerability in 10 mg increments at weekly or greater intervals up to a maximum dose of 60 mg/day. Some experts suggest a further increase up to 100 mg/day may be necessary in some patients for optimal response (BAP [Bolea-Alamañac 2014b]; Bukstein 2019).
  - Conversion from IR or intermediate-acting ER methylphenidate (eg, Metadate ER, Ritalin SR [Canadian product]) to Ritalin LA: Use equivalent TDD administered once daily.

Amphetamine/Dextroamphetamine Dosing

Immediate-release tablets:

- Children 3 to 5 years: Oral: Initial 2.5 mg once daily in the morning; increase daily dose by 2.5 mg at weekly intervals until optimal response is obtained; maximum daily dose: 40 mg/day administered in 1 to 2 divided doses per day; use intervals of 4 to 6 hours between doses. Note: Select patients may require daily dose to be given in 3 divided doses per day. Although FDA approved, current guidelines do not recommend dextroamphetamine/amphetamine use in children ≤5 years due to insufficient evidence (AAP 2011).
- Children ≥6 years and Adolescents: Oral: Initial: 5 mg once or twice daily; increase daily dose by 5 mg at weekly intervals until optimal response is obtained; usual maximum daily dose: 40 mg/day administered in 1 to 2 divided doses; use intervals of 4 to 6 hours between doses; some patients weighing >50 kg may require and tolerate doses up to 60 mg/day in divided doses with frequent monitoring (AACAP [Pliszka 2007]; Dopheide 2009). Note: Some patients may require daily dose to be administered as 3 divided doses per day.

Extended-release capsules:

Adderall XR:

- Initial therapy:
- Children 6 to 12 years: Oral: Initial: 5 to 10 mg once daily in the morning; increase daily dose by 5 mg or 10 mg at weekly intervals until optimal response is obtained; usual maximum daily dose: 30 mg/day; some patients weighing >50 kg may require and tolerate doses up to 60 mg/day (AACAP [Pliszka 2007]; Dopheide 2009)
- Adolescents 13 to 17 years: Oral: Initial: 10 mg once daily in the morning; may increase to 20 mg daily after 1 week if symptoms are not controlled; usual maximum daily dose: 20 mg/day; some patients weighing >50 kg may require and tolerate doses up to 60 mg/day with frequent monitoring (AACAP [Pliszka 2007]; Dopheide 2009)

- Converting Adderall to Adderall XR:Patients taking divided doses of immediate-release Adderall tablets may be switched to extended-release Adderall XR capsule using the same total daily dose (taken once daily); titrate dose at weekly intervals to achieve optimal response.

Mydayis: Note: Do not substitute Mydayis for other amphetamine products on a mg-per-mg basis because of different amphetamine base compositions and differing pharmacokinetic profiles.

- Adolescents 13 to 17 years: Oral: Initial: 12.5 mg once daily in the morning; may increase by 12.5 mg increments at weekly intervals; maximum daily dose: 25 mg/day

- Healthy Children – the American Academy of Pediatrics' website for parents – Has excellent section on ADHD www.healthychildren.org
- CHADD.org