



Management of Pediatric Attention Deficit & Hyperactivity Disorder (ADHD)

Clinical Practice Guideline MedStar Health

“The guidelines are provided to assist physicians and other clinicians in making decisions regarding the care of ADHD patients. They are not a substitute for individual judgment brought to each clinical situation by the patient’s primary care provider in collaboration with the patient. As with all clinical reference resources, they reflect the best understanding of the science of medicine at the time of publication but should be used with the clear understanding that continued research may result in new knowledge and recommendations”.

NOTE: Most recent guideline from 2019 includes only incremental updates to the previous guideline of 2020.

INTRODUCTION

The essential feature of attention-deficit/hyperactivity disorder (ADHD) is a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development. (AAP, DSM- V p 59 <https://archive.org/details/DSM5Eng/page/n95/mode/2up>). The prevalence of Attention-Deficit/Hyperactivity Disorder is estimated at 8% in school-age children.

Data on prevalence in adolescence and adulthood however are limited. Usually, the disorder is first diagnosed as early as possible when academic performance is compromised. In most cases seen in clinical settings, the disorder is relatively stable through early adolescence.

The primary care provider should recognize that ADHD is a chronic condition and therefore consider children and adolescents with ADHD as children and youth with special health needs. Care of such children should utilize the principles of medical home and chronic care models to guide treatment.

Summary of Recommendations

Evaluation

The primary care provider should evaluate a child 4-18 years old who present with academic and behavioral problems accompanied by reported symptoms of inattention, hyperactivity, or impulsivity. Provider should first determine that diagnostic criteria are met as defined by American Psychiatric Association, 2013, Diagnostic and Statistical Manual of Mental Disorders – 5th Edition (<https://archive.org/details/DSM5Eng/page/n95/mode/2up>) documenting impairment of the child in more than one setting (e.g. school and home).

The provider should also utilize supporting documents utilizing a validated instrument such as the Vanderbilt Assessment (https://www.nichq.org/sites/default/files/resource-file/NICHQ_Vanderbilt_Assessment_Scales.pdf) from schools, mental health providers, teachers, guardians, parents, and/or other school clinicians/other significant adults. Assessment

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for the coexistence of other conditions such as emotional, behavioral, developmental, or physical disorders (e.g., anxiety, depression, oppositional defiance, conduct disorder, substance use, learning or language disorders, neurodevelopmental disorders, autism spectrum disorders, tics, sleep apnea, etc.) *should also be performed.*

Careful consideration should be given to rule out any other possible causes such as undetected seizure conditions, middle ear infections resulting in hearing change or loss, undetected vision or hearing problems, medical conditions that may affect thinking and behavior, learning disabilities, or significant and sudden life changes such as death of a family member, a divorce, or parental job loss.

Consider psycho-educational testing as a part of the evaluation process for ADHD. Requesting an Individualized Education Plan through the public-school system is a part of the individuals with disabilities education act (IDEA). A parent educational handout is available via link "Educational Rights for children with ADHD".

<https://chadd.org/wpcontent/uploads/2019/12/Educational-Rights-for-Children-2017.pdf>

Please note that unless they previously received a diagnosis, to meet DSM-5 criteria for ADHD, adolescents must have some reported or documented manifestations of inattention or hyperactivity/impulsivity before age 12. Therefore, clinicians must establish that an adolescent had manifestations of ADHD before age 12 and strongly consider whether a mimicking or comorbid condition, such as substance use, depression and/or anxiety is present.

Clinicians should also be aware that adolescents are at risk for substance use. Certain substances, such as marijuana, can have effects that mimic ADHD. In addition, some adolescents may also attempt to obtain stimulant medication to enhance performance (i.e., academic, athletic, etc.) by feigning symptoms.

Risk Factors for ADHD

ADHD has been found to be more common in the first-degree biological relatives of children with Attention-Deficit/Hyperactivity Disorder. Studies also suggest that there is a higher prevalence of Mood and Anxiety Disorders, Learning Disorders, Substance-Related Disorders, and Antisocial Personality Disorder in family members of individuals with Attention-Deficit/Hyperactivity Disorder.

In addition to genetic predisposition, other factors such as environmental factors, brain injuries, sugar, and food additives can be associated with ADHD.

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Diagnostic criteria for Attention-Deficit/Hyperactivity Disorder

A. Either (1) or (2):

1. Inattention

Six (or more) of the following symptoms of **inattention** 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:

- (a) Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or 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, 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) Easily distracted by extraneous stimuli (for older adolescents, may include unrelated thoughts).
- (i) Forgetful of daily activities (e.g., doing chores, running errands; for older adolescents, returning calls, paying bills, keeping appointments).

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2. Hyperactivity/ Impulsivity

Six (or more) of the following symptoms of hyperactivity/impulsivity 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:

- (a) Often fidgets with hands or feet or squirms in seat
- (b) Often leaves seat in classroom or in other situations in which 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 excessively in situations in which it is inappropriate (in adolescents may be limited to subjective feelings of restlessness)
- (d) Often has difficulty playing or engaging in leisure activities quietly
- (e) "On the go" or often acts 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 answers before questions have been completed
- (h) Often has difficulty awaiting turn
- (i) Often interrupts or intrudes on others (e.g., butts into conversations or games or activities; may start using other people's things without asking or receiving permission; for adolescents may intrude into or take over what others are doing).

B. Several hyperactive-impulsive or inattentive symptoms that caused impairment were present prior to age 12 years.

C. Some impairment from the symptoms is present in two or more settings (e.g., at home, school, or work; with friends or relatives; in other activities).

D. There must be clear evidence that the symptoms interfere with or reduce the quality of social, academic, or occupational functioning.

E. 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).

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ADHD Treatment:

Treatment of children and youth with ADHD vary depending on age:

1. Age 4-5 (preschool)

- a) Evidence-based parent and/or teacher administered behavior therapy is first line treatment.
- b) Consider prescribing a stimulant medication if the behavior interventions do not provide significant improvement and there is moderate to severe behavior continuing disturbance in the child's function.
- c) If behavioral treatment is not available, providers should weigh the risks of starting medication at an early age against the harm of delaying diagnosis and treatment.

2. Age 6-11 (elementary school)

- a) providers should prescribe US FDA approved medication for ADHD along with evidence-based parent and/or teacher administered behavior therapy.
- b) Per AAP's 2019 guideline on ADHD, the evidence is particularly strong for stimulant medications and sufficient but not as strong for atomoxetine, extended release guanfacine, and extended release clonidine (in that order). Educational interventions and individualized instructional supports, including school environment, class placement, instructional placement, and behavioral supports, are necessary for any treatment plan and often include an Individualized Education Program (IEP) or a rehabilitation plan (504 plan).

3. Age 12-18 (adolescents)

- a) Provider should prescribe US FDA approved medications for ADHD with the assent of the adolescent along with training interventions and/or behavior therapy. Educational interventions and individualized instructional supports, including school environment, class placement, instructional placement, and behavioral supports, are necessary for any treatment plan and often include an Individualized Education Program (IEP) or a rehabilitation plan (504 plan).

Treatment recommendations taken from AAP ADHD guideline please access pg. 14-16 of AAP ADHD Guideline at <https://pediatrics.aappublications.org/content/144/4/e20192528>

Providers should titrate doses of medication for ADHD to achieve maximum benefit with minimum adverse effects. If providers are trained or experienced in diagnosing comorbid psychiatric conditions, they may start treatment of these comorbid conditions or consult an appropriate subspecialist for treatment.

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The use of pharmacogenomics, specifically *CYP2D6* testing, represents an emerging technology to guide atomoxetine dose and choice. For further patient related questions consult the MedStar pharmacogenomics team.

Link for Pharmacogenomics Starport page: [MSH Pharmacogenomics StarPort](#)

Level of Intervention	AAP (2011)
I	Age 4-5 yrs.: Behavior therapy Age 6-18 years: Behavior therapy + methylphenidate or amphetamine
II	Age 4- 5yrs.: Continue behavior therapy + add methylphenidate Age 6-18yrs.: Continue behavior Therapy+ add Atomoxetine, guanfacine XR or clonidine XR
III	If none of the above is satisfactory, review diagnosis
IV	Add bupropion, TCA, or Alpha2 – agonist

Information from American Academy of Pediatrics (AAP) ADHD. Clinical practice guideline for the diagnosis, evaluation, and treatment of attention deficit/hyperactivity disorder in children and adolescent. Pediatrics 2011; 128:1077-22.

PARENT EDUCATION:

Education of parents is central to treatment and to ensure cooperation to reach goals. Parents should be warned that frequent titration of medication and/or change of medication is sometimes necessary to reach optimal medication management as well as successful treatment and may take several months to achieve.

Published Guidance:

1. The AAP released new guidelines for treatment of ADHD in 2019 and were endorsed by the AAFP in 2019 and can be fully accessed at <https://pediatrics.aappublications.org/content/145/3/e20193997>
2. CHADD/NICHQ Vanderbilt Assessment Tools can be found at https://www.nichq.org/sites/default/files/resourcefile/NICHQ_Vanderbilt_Assessment_Scales.pdf
<https://chadd.org/for-professionals/clinical-practice-tools/>
3. A treatment care algorithm is available. Please see link below. AAP, 2019. ADHD process-of-care algorithm. Pediatrics. 2019;144(4). Retrieved from https://pediatrics.aappublications.org/content/pediatrics/suppl/2019/09/18/peds.2019-2528.DCSupplemental/PEDS_20192528SupplementaryData1.pdf

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ADHD Pharmacologic Treatment list (Appendix A)

- Visual aid for ADHD medication guide recommended by the FDA.
- This link includes a user agreement as well as hard copy sale information for this guide.
<http://www.adhdmedicationguide.com/>

Appendix A: Treatment of Attention- Deficit/Hyperactivity Disorder

<ul style="list-style-type: none"> • Color of tables present medications group • Average Wholesale Price (AWP): Price range is provided as reference price only – Obtained 10/2021 	
Methylphenidate IR/Dexmethylphenidate	Methylphenidate Long acting/Extended Release
Amphetamine Long acting/Extended	Non--Stimulants

A. Stimulants Pharmacologic Treatment:

a. **Methylphenidate - Mechanism of action:** Dopamine transport blockers resulting in sympathomimetic activity in the CNS.

Methylphenidate Immediate Release (IR) Formulations: Onset and Duration of Action

Methylphenidate Immediate Release: Dosing Recommendations

Generic Name	Brand Name	Formulation	Onset	Duration of Action	Pricing
Methylphenidate IR	Ritalin [Tablet]	5mg, 10mg, 20mg	Clinical Onset: 20-60 min Time to peak: 1-4 hr	3- 5 hr	5mg: \$0.79 10mg: \$1.12 20mg: \$1.61 Per mL \$0.17 Per mL \$0.24
	Methylin [Solution]	5mg/5mL, 10mg/5mL			
Initial Dose		Titrate Weekly	Dosing Range		Max Dose
Children 3 to 5 years: 2.5 mg twice daily (8 a.m. and noon)		1.25- 2.5mg/day	3.75- 30 mg /day in 2 to 3 divided doses (8a.m., noon, and 4 p.m.)		30mg/day
Children ≥6 years: 2.5mg to 5 mg twice daily (8a.m. and noon)		5 to 10 mg/day	20-60 mg /day in 2 to 3 divided doses (8a.m., noon, and 4 p.m.)		≤ 50 kg: 2mg/kg/day, or 60mg/day >50Kg: 100mg/day

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Dexmethylphenidate Formulations: Onset and Duration of Action

Generic Name	Brand Name	Formulation	Onset	Duration of Action	Pricing
Dexmethylphenidate IR	Focalin [Tablet]	2.5, 5, 10mg	Clinical Onset: 30min Time to Peak: 1-1 ½ hr	3-5 hr	2.5mg:\$0.76 5mg: \$1.08 10mg: \$1.56
Dexmethylphenidate Extended Release 24 Hour	Focalin XR [Capsule]	5, 10, 15,20,25, 30, 35, 40mg -Bi-model release 50/50 IR/ER -Can be sprinkled on food	Clinical Onset: 30 min Time to Peak: Initial 1 ½ hr Second 6 ½ hr	12 hr	5mg: \$10 10mg: \$15 20mg: \$15 25mg: \$16 30mg: \$15 35mg: \$17 40mg: \$ 15

Dexmethylphenidate: Dosing Recommendations

Initial Dose	Titrate Weekly	Dosing Range	Max Dose
Immediate Release Children ≥6 years: 2.5mg twice daily (8a.m. and noon)	2.5-5mg	5-20mg	20mg/day; however, some may require and tolerate up to 50mg/day
Extended Release Children ≥6 years: 5mg once daily 8a.m.	5mg/day	5-30mg	30mg/day; however, some may require and tolerate up to 50mg/day

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Methylphenidate Extended-release, Sustained-release, and Long-acting products: Onset and Duration of Action

Generic Name	Brand Name	Formulation	Onset	Duration of Action	Pricing
Methylphenidate Extended Release	Adhansia XR [Capsule]	25,35,45,55, 70,85mg	Time to Peak: Initial: 1-4hr Second: 8-14hr	16hr	\$13.2
Methylphenidate Extended Release	Apetensio XR [Capsule]	10, 15,20,30, 40,50,60mg -Multi layered beads - 40%/60 IR/ER	Time to Peak: Adults: Initial:2hr Second 8hr	12-16hr	\$10
Methylphenidate (OROS)	Concerta [Tablet]	-18,27,36,54mg -Osmotic active trilayer Controlled release -22%/78 IR/SR	Clinical Onset: 1-2hr Time to Peak: 6-10hr	12hr	\$14.5-16
Methylphenidate XR-Disintegrating	Cotempla XR [ODT-Tablet]	8.6, 17.3, 25.9mg	Time to Peak: 4 ½ -5 ½ hr	6-8hr	\$17.8
Methylphenidate transdermal. [Voluntary Recalled in May 2021]	Daytrana [Patch]	Patch:10,15,20,30mg *Patch is left on for 9hr at a time	Clinical Onset: 1 hr after patch placement Time to Peak: 1-1 ½ hr	11-12hr Can be removed earlier for duration of flexibility. Once removed, effect should be gone in 2-3 hr	\$16.8
Methylphenidate ER	Jornay PM [Capsule]	20,40,60,80,100mg	Time to Peak: Adults: 14hr	10-12hr	\$16.17
Methylphenidate ER	Metadate ER [Tablet]	10 [20mg discontinued]	Clinical Onset: 20-60 min Time to Peak: 5hr	6-8hr	\$7.5-8
Metadate CD **Discontinued ***					
Methylphenidate Chewable ER	QuilliChew ER Tablet	20,30,40mg	Time to Peak: Adults 5 hr	6-8hr	\$14.91
Methylphenidate ER	Quillivant XR [Suspension]	25mg/5mL	Clinical Onset: 30-60min Time to Peak: Children: 4hr Adolescents: 2hr	6-8hr	\$3.29 (Per mL)
Methylphenidate ER	Relexxii [Tablet]	72mg	Clinical Onset: Initial 1 hr Followed by gradual ascending conc. 5-9hr Time to Peak: 5 to 9 hrs	12hr	\$25.34
Methylphenidate SR	Ritalin SR [Tablet] Canadian Product	20mg	Clinical Onset: 60-180min Time to Peak: Initial 5hr	6-8hr	---

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Methylphenidate LA	Ritalin LA [Capsule]	10,20,30,40mg And 50,60mg [Generic] -Beaded Controlled release -50%/50 IR/ER	Clinical Onset: 30-60min Time to Peak: 5hr	6-8hr	\$12-12.5
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Methylphenidate Extended-release, Sustained-release, and Long-acting products: Dosing Recommendations

Initial Dose	Titrate Weekly	Dosing Range	Max Dose
Adhansia XR Children ≥6 yr.: 25mg once daily in the a.m.	10mg-15mg	To cover from other methylphenidate products, discontinue that treatment and begin Adhansia XR with titration schedule described	85mg/day. doses ≥70mg /day although efficacious, were associated with disproportionate increase in adverse reaction
Aptensio XR Children ≥6 yr.: 10mg once daily in the a.m.	10mg	--	60mg/day
Concerta Children ≥6 yr.: Methylphenidate- Naïve Pts, initial: 18mg once daily	18mg/day Note: a dosage strength of 27mg is available for situations in which a dosage between 18 and 36mg is desired.	18-108 mg	Children 6-12yr: 54mg/day Adolescents: ≤50Kg: 72mg/day >50Kg: 108mg/day
Patient using IR Methylphenidate follow below recommendations			
5mg 2 to 3 times daily: Concerta 18mg once daily			
10mg 2 to 3 times daily: Concerta 36mg once daily			
15mg 2 to 3 times daily: Concerta 54mg once daily			
20mg 2 to 3 times daily: Concerta 72mg once daily			
Contempla XR-ODT	8.6-17.3 mg	--	51.8mg/day

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Children ≥6 yr.: 17.3 mg once daily in the morning			
Jornay PM: Children ≥6 yr.: 20mg once daily between 6:30 and 9:30 PM	20mg	If converting from another methylphenidate formulation, discontinue previous formulation and titrate Jornay PM using this schedule; do not substitute mg-per-mg basis.	100mg/day
Metadate ER, Ritalin-SR Children ≥6 yr.: 20mg daily Replace immediate release tablets when the 8-hr disease corresponds to sustain/extended release tablet size.	20mg	20-60mg once or twice daily	≤50Kg: 60mg/day >50Kg: 100mg/day
Metadate CD ***Discontinued ***	---		---
QuilliChew ER Children ≥6 yr.: 20mg once daily in a.m.	10-20mg (tablets are scored and may be broken in half to achieve dose)	If converting from another methylphenidate formulation, discontinue previous formulation and titrate QuilliChew ER using provided schedule; do NOT substitute on mg-per-mg basis.	60mg/day
Quillivant XR Children ≥6 yr.: 20mg once daily in a.m.	10-20mg/day	--	60mg/day
Ritalin LA Children ≥6 yr.: Methylphenidate- Naïve Pts, Initial: 20mg once daily	10mg/day		≤50Kg: 60mg/day >50Kg: 100mg/day

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<p>Patients currently receiving immediate-release methylphenidate: The same total daily dose of Ritalin LA should be used</p>			
<p>Patients currently receiving methylphenidate SR (Brand name Ritalin SR): The same total daily dose of Ritalin LA should be used</p>			
<p>Daytrana Transdermal Patch: [Voluntary Recalled in May 2021]</p> <p>Children ≥6 yr.: 10mg patch once daily; apply to hip 2 hrs. before effect is needed and remove 9 hrs. after application (e.g., 3 hours before bedtime)</p>	<p>Increase to next transdermal patch dosage size no more frequently than every week</p>	<p>Patch may be removed before 9 hrs. if a shorter duration of action is required or if late day adverse effects appear or may be worn for up to 16hrs if extended duration of effects are needed. Plasma conc. usually start to decline when the patch is removed but drug absorption may continue for several hrs after patch removal.</p>	

Note: The manufacture’s labeling recommends patients converting from another formulation of methylphenidate to the transdermal patch should be initiated at 10mg regardless of previous dose and titrated as needed due to the differences in bioavailability of the transdermal formulation. However, some clinicians have supported higher starting patch doses for patient converting from oral methylphenidate doses of > 20mg /day. See Examples in table below

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	Approximate oral equivalent daily dose	
Patch size (Daytrana)	Immediate release (mg/day)	Osmotic release (eg, Concerta) (mg/day)
15 mg (18.75 cm ²)	22.5	27
20 mg (25 cm ²)	30	36
30 mg (37.5 cm ²)	45	54

Reference: Arnold LE, Lindsay RL, López FA, et al. Treating attention-deficit/hyperactivity disorder with a stimulant transdermal patch: the clinical art. *Pediatrics*. 2007;120(5):1100-1106. doi: 10.1542/peds.2007-0542 [PubMed 17974748]

- b. Amphetamine stimulants**-Mechanism of action: Stimulates the release of dopamine and norepinephrine into the presynaptic nerve terminal.

Amphetamine Formulations: Onset and Duration of Action

Generic Name	Brand Name	Formulation	Onset	Duration of Action	Pricing
Amphetamine/ Dextroamphetamine Immediate Release	Adderall [Tablet]	5, 7.5, 10, 12.5, 15, 20, 30mg	Onset of action: 30-60min Time to peak: 3 hr	4-6hr	Generic: \$2.06/ Tab Brand: \$9.83/Tab
Amphetamine IR	Evekeo [ODT]	5, 10, 15, 20mg	Onset of action: 30-60min Time to peak: 3 hr	4-6hr	\$8.25/ disintegrated Tab
Amphetamine IR	Evekeo [Tablet]	5, 10mg	Onset of action: 30-60min Time to peak: 3 hr	4-6hr	\$8.25/ tab
Amphetamine/ Dextroamphetamine Extended release	Adderall XR [Capsule]	5, 10,15, 20, 25, 30mg.	Onset of action: 30-60min Time to Peak: 7hr	6-9hr	\$ 1.97 -7.05 per each
Amphetamine/ Dextroamphetamine Extended release	Mydayis [Capsule]	12.5, 25, 37.5,50mg	Onset of action: 30-60min Time to Peak: 7hr	6-9hr	\$12.29/Cap
Amphetamine XR	Adzenys XR- ODT [Tablet]	3.1, 3.6, 9.4, 12.5, 15.7, 18.8mg	Time to Peak: 5- 7hr	10-11hr	\$17.42/ Extended release Dispersible

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	Adzenys ER [Suspension] **Discontinued**	1.25mg/mL **Discontinued**			
Amphetamine XR	Dyanavel XR [Suspension]	2.5mg/mL	Time to Peak: 5- 7hr	10-11hr	\$3.37 per mL
Dextroamphetamine	ProCentra [Suspension]	5mg/5mL	Onset of action: 60-80min Time to Peak: 3 hr	4-6hr	\$2.03/mL
Dextroamphetamine	Zenzedi [Tablet]	2.5, 5, 7.5,10,15, 20,30mg	Onset of action: 60-80min Time to Peak: 3 hr	4-6hr	\$8.82/Tab
Dextroamphetamine ER	Dexedrine [Capsule]	5,10,15mg	Onset of action: 60-90min Time to Peak: 8hr	8hr	Brand: \$28.13/ Cap [Therapy pack] Generic: \$4.05- \$6.87/Cap
Lisdexamfetamine (prodrug of dextroamphetamine)	Vyvanse [Capsule] [Chewable tablet]	Capsule:10, 20,30,40,50, 60,70mg [May open and place in water] Chewable tablets: 10,20,30,40, 50,60mg	Onset of action:1hr Time to Peak: Lisdexamphetamine: 1hr Dextroamphetamine: Capsule: 3 ½ hr Chewable: 3.9- 4.4hr	10-12hr	\$13.40/Cap \$13.40/Chew

Amphetamine: Dosing Recommendations

Initial Dose	Titrate Weekly	Dosing Range	Max Dose
Adderall: Children 3 to 5yr: 2.5mg once daily in a.m. -Although FDA approve, current guidelines do not recommend dextroamphetamine/amphetamine use in children ≤5 yrs. due to insufficient evidence	2.5mg given in one or two divided doses. 5mg given in one or two divided	10-40mg Use intervals of 4 to 6 hrs. between doses.	40mg/day Patients >50Kg: May require and tolerate 60mg/day divided doses.

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Children: ≥6yr: 5mg once or twice daily	doses. Some patients may require daily dose to be administered as 3 divided doses per day		
Adderall XR: Children 6 to 12 yrs.: 5 to 10mg once daily in a.m.	5-10mg	5-30mg	≤50Kg: 30mg/day >50Kg: 60mg/day
Adolescents 13 to 17 yrs.: 10mg once daily in a.m.	20mg		≤50Kg: 20mg/day >50Kg: 60mg/day
Converting Adderall to Adderall XR: Pt's taking divided dose of IR Adderall tablets may be switched to XR capsule using the same total daily dose (taken once daily); titrate dose at weekly intervals to achieve optimal response			
Mydayis: Adolescents 13 to 17yrs: 12.5mg once daily in a.m.	12.5mg	Note: Do NOT substitute Mydayis for other amphetamine products on a mg-per-mg basis because different amphetamine base compositions and differing pharmacokinetics profiles.	25mg/day
Evekeo ODT: Children ≥6yrs.: 5mg once or twice daily; first dose should be given a awakening; if additional daily doses necessary, separate dose(s) by 4-6hr interval.	5mg	--	Daily doses > 40mg/day are rarely necessary.
Evekeo: Children 3 to 5 yrs.: 2.5mg once daily	2.5mg	--	Maximum dose not specified; In children ≥6yrs. Daily doses >

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Children ≥6yrs.: 5 mg once or twice daily. -First dose should be given a awakening; if additional daily doses necessary, separate dose(s) by 4-6hr interval.			40mg/day are rarely necessary.
Adzenys XR-ODT and Adzenys XR- Suspension: 6.3mg once daily in the a.m.	3.1-6.3mg	--	Ages: 6-12yrs: 18.8mg/day 13-18yrs: 12.5mg/day.

To convert Adderall XR to Adzenys XR-ODT: the following conversions may be applied
Equivalent dosing (once-daily administration)

Adderall XR (current once-daily dose)	Adzenys XR-ODT (initial once-daily dose)
5 mg	3.1 mg
10 mg	6.3 mg
15 mg	9.4 mg
20 mg	12.5 mg
25 mg	15.7 mg
30 mg	18.8 mg

Reference: Adzenys XR-ODT (amphetamine) [prescribing information]. Grand Prairie, TX: Neos Therapeutics; February 2018

To convert* OTHER* amphetamine products to Adzenys XR-ODT: Discontinue that treatment, and then initiate and titrate Adzenys XR-ODT as per the recommended dosing schedule.

Dyanavel XR: Children ≥6yr: 2.5mg -5mg once daily in a.m.	2.5-10mg	--	20mg/day
ProCentra [Suspension] & Zenzedi [Tablet]: Children 3 to 5 yrs.: 2.5mg once daily in a.m.	2.5mg	Use interval of 4 to 6 hrs. between doses	40mg/day in 2 to 3 divided doses. Although FDA approved, current guidelines do NOT recommend use in children ≤5yrs. Due to

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Children ≥6yr: 5mg once or twice daily with first dose in the morning	5mg	Usual range 5 to 20mg/day	insufficient evidence
Dexedrine Extended Release: Children ≥6yr: 5mg once or twice daily with first dose in a.m.	5mg	5 to 20mg/day	≤50 Kg: 40mg/day in 1 to 2 divided doses; use interval of 6 to 8hrs between doses. >50 Kg: 60mg/day in divided doses has been used
Lisdexamfetamine Children ≥6yr: 20-30mg once daily in a.m.	10-20mg	20-70mg	70mg/day

a. Adverse Reactions of Stimulants:

- i. Increase in blood pressure/ heart rate
- ii. Psychosis or manic symptoms
- iii. Decreased appetite
 - a) Eat high-calorie breakfast and dinner.
 - b) Assess for weight loss.
- iv. Insomnia (give in morning or reduce afternoon dose)
- v. GI distress (take with high-fat meal)
- vi. Irritability
- vii. Headache
- viii. Growth suppression
 - a) Drug holidays: Discontinue use during the summer or on weekends.
 - b) Consider risk-benefit.
 - c) Over time, patients seem to catch up.

B. Non-Stimulant Pharmacologic Treatments:

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a. **Atomoxetine and Qelbree:** Selective norepinephrine reuptake inhibitor.

Initial Dose	Titrate	Target Range	Pharmacokinetics	Max Dose
Atomoxetine ≤ 70Kg: 0.5mg/kg/day, once daily in a.m. or in 2 divided doses; in a.m. and late afternoon /early evening.	after 3 days -In patients known to be <i>CYP2D6</i> poor metabolizers, if tolerating therapy but inadequate response, may increase after min. of 4 weeks to 1.2mg/kg/day	1.2 mg/kg/day	Time to Peak: 1-2hr -Hepatically Metabolized <i>CYP2D6</i> and <i>CYP2C19</i> Half-life: 5hr (24hrs in Poor metabolizers) Active Metabolite: Half-life: 6-8hrs (30-40 hrs. in Poor metabolizers)	1.4mg/kg/day or 100mg/day, whichever is less. NOTE: Doses>1.2mg/kg/day have not been shown to provide additional benefit.
Atomoxetine >70 Kg: 40mg once daily in a.m., or in 2 divided doses; in a.m. and late afternoon /early evening.	After 3 days -In patients known to be <i>CYP2D6</i> poor metabolizers, if tolerating therapy but inadequate response, may increase after min. of 4 weeks to 80mg/day	80mg/day		100mg/day
Viloxazine [Qelbree Brand Name] Children 6 to 11 yrs.: 100mg once daily	100mg weekly	Contraindications include concomitant use or use within 14 days after discontinuing a monoamine oxidase inhibitor.	-Capsule swallowed whole or opened sprinkled. It should not be crushed, cut, or chewed	400mg/day Severe renal impairment (eGFR <30 ml/minute/1.73 m ²): Oral: Initial dose: 100 mg once daily; may titrate by 50 to 100 mg increments at weekly intervals based on response and tolerability; maximum daily dose: 200 mg/day
Viloxazine [Qelbree Brand Name] Children 12 to 17yrs. 200mg once daily	200mg weekly			

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Products:	Formulations Capsules	Price (per each)-Average Wholesale Price
Atomoxetine	10, 18, 25, 40 mg	\$15
Atomoxetine	40 (Strattera Brand), 60, 80mg	\$17
Atomoxetine	80, 100mg	\$18
Qelbree ER Capsule	100, 150, 200mg	\$11.96

- b. **Alpha 2-Adrenergic Agonists- Mechanism of Action:** Central alpha 2 adrenergic receptor agonists inhibit presynaptic norepinephrine release and post-synaptically increase blood flow to the prefrontal cortex.

Generic Name	Titrate Weekly	Pharmacokinetics	Max Dose
Clonidine IR [Catapres Tablet] Children ≥6yr: ≤ 45Kg: 0.05mg once at bedtime. >45Kg: 0.1mg once at bedtime Note: When discontinuing therapy, taper over 1 to 2 weeks	0.05mg/day Given twice daily, then 3 times daily, then 4 times daily 0.1mg /day Given twice daily, then 3 times daily, then 4 times daily	Time to Peak: 3-5 hr Half-life: Children: 8-12hrs Adults: 12-16 hr -Hepatic metabolism -Renally Cleared	27 to 40.5Kg: 0.2mg/day 41 to 45Kg: 0.3mg/day 0.4mg/day
Clonidine ER [Kapvay Tablet] Children ≥6yr: 0.1mg at bedtime Note: When discontinuing therapy, taper daily dose by no more than 0.1mg every 3-7days	0.1mg/day Doses given twice daily in the a.m. and bedtime (either split equally or with the higher split dosage given at bedtime)	Onset of action: 1-2 weeks Time to Peak: 7-8hr	0.4mg/day
Transdermal Clonidine [Catapres-TTS Patch]: Children ≥6yr: Transdermal dose ~ equivalent to the total oral daily dose -Change patch every 5-7 days	Patient may be switched to transdermal delivery system after oral dose is titrated to an optimal and stable dose.	Clonidine Patch delivers: 0.1, 0.2, or 0.3 mg/ 24hr	

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Formulations	Price (per each)-Average Wholesale Price
Clonidine Generic Tablet: 0.1, 0.2, 0.3 mg	\$0.05-0.63
Catapres Tablet 0.1,0.2, 0.3 mg	\$3.26-6.26
Clonidine ER Generic Tablet 0.1 mg	\$4.5-7.95
Kapvay (Clonidine Brand) Tablet 0.1mg	\$8.84
Clonidine Patch generic: 0.1, 0.2, 0.3 mg/ 24hr	\$33, \$56, \$77.45

Generic Name	Titrate	Max Dose	Price (per each)
GuanFACINE IR: Children ≥6yr: ≤ 45Kg: 0.5mg once daily at bedtime	0.5mg / day every 3-4days.	27 Kg - 40.5Kg: 2mg/day	1mg: \$1 2mg: \$1.5
	-0.5mg twice daily, then 0.5mg three times daily, then 0.5mg four times daily.	41 - 45Kg: 3mg/day	
>45Kg: 1mg once daily at bedtime	1mg day every 3-4days -1mg twice daily, then 1mg three times daily, then 1 mg four times daily.	4mg/day	
GuanFACINE ER [Intuniv Tablet]: Children ≥6yr: 1mg once daily ----- Conversion from IR Guanfacine to ER: Discontinue IR and initiate ER at the dose recommended	1mg/ day per week Target dose range: NOT to exceed age-based max daily doses: 25 to 33.9 kg: 2 to 3 mg/day. 34 to 41.4 kg: 2 to 4 mg/day. 41.5 to 49.4 kg: 3 to 5 mg/day. 49.5 to 58.4 kg: 3 to 6 mg/day. 58.5 to 91 kg: 4 to 7 mg/day. >91 kg: 5 to 7 mg/day.	Monotherapy: 6-12 yrs.: 4mg/day 13-17 yrs.: 7mg/day Adjunct therapy (with psychostimulants): 4mg/day	1,2,3,4mg: \$10.5 1,2,3,4mg [Brand name]: \$11.7

1. Adverse Reactions of Alpha 2 agonists:

- i. Bradycardia
- ii. Hypotension
- iii. Drowsiness: Schedule at bedtime

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d. Bupropion-Mechanism of action: Reuptake inhibitor of dopamine and norepinephrine

Formulation	Switch from IR to SR or XL	Max Dose	Generic Price (per each):
Bupropion IR [Tablet] Children ≥6yr: 1.5-3 mg/kg/day in 2 to 3 divided doses	---	6mg/kg/Day or 300mg/day (with no single dose > 150mg/day)	75mg: \$1.45 100mg: \$1-2
Bupropion SR 12- hour sustained release [Wellbutrin SR Tablet] Swallow Tablet as Whole	May be used in place of IR tablets, once the daily dose is titrated using the immediate-release product and the titrated 12-hour dosage corresponds to a sustained-release tablet (Wellbutrin SR) or the 24-hour dosage range corresponds to an extended-release tablet size (Wellbutrin XL)	400mg/day	100mg: \$ 1.7 150mg: \$ 1.9 200mg: \$3.8
Bupropion XL 24-hour extended release [Wellbutrin XL Tablet] Swallow Tablet as Whole		450mg/day	150mg: \$0.33-5.2 300mg: \$0.55-20 450mg: \$16-17

1. Adverse Reactions of Bupropion:

- a. Dry mouth
- b. Tachycardia
- c. Weight loss
- d. Auditory disturbance

2. US Boxed Warning:

- i. Suicidal ideation in patients < 24 years.

3. Caution: Use with caution in patients with cardiovascular disease, history of hypertension, or coronary artery disease.

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e. **Tricyclic Antidepressants (TCA)- Note:** Should **NOT** be used first-line; use should be reserved for cases where other therapies have **failed** or **NOT** tolerated.

Mechanism of Action:

Traditionally believed to increase the synaptic concentration of norepinephrine (and to a lesser extent, serotonin) in the central nervous system by inhibition of its reuptake by the presynaptic neuronal membrane. However, additional receptor effects have been found including desensitization of adenylylase, down regulation of beta-adrenergic receptors, and down regulation of serotonin receptors.

- Can be useful in treating patients with comorbidities of depression or anxiety disorder, Tourette's syndrome.

Initial Dose	Titrate Weekly	Max Dose	Price
Desipramine Children 5 to < 7 yrs.: 0.75mg/kg/dose twice daily Children ≥7 yrs.: 25mg once daily at bedtime	Titrate slowly	3.5mg/kg/day divided two doses	Each Tablet: 10 mg \$1.18 - \$1.67 25 mg \$1.42 - \$2.00 50 mg \$2.68 - \$3.77 75 mg \$3.10 - \$4.80 100 mg \$4.48 - \$6.31
	25mg/day	25mg four times a day (100mg/day) Not to exceed 3mg/kg/day	
Nortriptyline: Children ≥6 yrs.: 0.5 mg/kg/day Trough: 50-150ng/mL	0.5 mg/kg/day. Doses may be divided twice daily (a.m. and after dinner)	2 mg/kg/day up to 100 mg/day	Solution 10mg/5mL (per mL): \$ 0.44 Each capsule: 10,25,50,75mg: \$0.75, \$1.5, \$2.77, \$4.22

1. Adverse Reactions:

- i. Dry mouth, urinary retention, constipation
- ii. Increase diastolic blood pressure, pulse rate
- iii. Appetite suppressant
- iv. Nortriptyline: Weight gain

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