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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 2020 includes only incremental updates to the previous guideline of 2019.

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 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/wp-content/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 and traumatic brain injuries can be associated with ADHD.

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).

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 (see treatment table):

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

ADHD Treatment Table (levels based on follow up assessment)

Level of Intervention	AAP (2019)
I	Age 4-5 yrs.: Behavior therapy Age 6-18 years: Behavior therapy + stimulant
II	Age 4- 5yrs.: Continue behavior therapy + add stimulant Age 6-18yrs.: Continue behavior therapy and stimulant; add Atomoxetine, guanfacine XR or clonidine XR
III	If none of the above is satisfactory, review diagnosis
IV	Consult MedStar Pharmacogenomics or Consult Pediatric Psychiatry or Behavioral Pediatrician Consider adding 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* (2019) 144 (4): e20192528.

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

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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://publications.aap.org/pediatrics/article/144/4/e20192528/81590/Clinical-Practice-Guideline-for-the-Diagnosis

2. CHADD/NICHQ Vanderbilt Assessment Tools can be found at

https://nichq.org/sites/default/files/resource-file/NICHQ_Vanderbilt_Assessment_Scales.pdf

https://chadd.org/for-professionals/clinical-practice-tools/

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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/

- Average Wholesale Price (AWP): Price range is provided as reference price only – Obtained 10/2023

A. Central Nervous System Stimulants Pharmacologic Treatment:

I. 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) Assessing 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.

II. Methylphenidate

Mechanism of action: Dopamine transport blockers resulting in sympathomimetic activity in the CNS.

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Table 2 Methylphenidate Immediate Release (IR)

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

Table 1 Central Nervous System Stimulant-Methylphenidate Extended Release, Sustained Release, & Long Acting

Generic Name	Brand Name	Onset	Duration of Action	Formulation & Pricing
Methylphenidate Extended Release	Adhansia XR Capsule *Discontinued*	Time to Peak: Initial: 1-4hr Second: 8-14hr	16hr	25, 35, 45, 55, 70, 85mg: $13.2
Methylphenidate Extended Release -Multi layered beads 40% IR/60 ER	Apetensio XR Capsule	Time to Peak: Adults: Initial:2hr Second 8hr	12-16hr	10, 15, 20, 30, 40, 50, 60mg: $10
Methylphenidate OROS- Osmotic active Tri layer Controlled release 22%/78 IR/SR	Concerta Tablet	Clinical Onset: 1-2hr Time to Peak: 6-10hr	12hr	18, 27, 36, 54mg: $15.48-17.81
Methylphenidate XR-disintegrating	Cotempla XR ODT-Tablet	Time to Peak: 4 ½ -5 ½ hr	6-8hr	8.6, 17.3, 25.9mg: $19.57
Methylphenidate transdermal -Patch is left on for 9hr at a time	Daytrana Patch Available in generics	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	10, 15 ,20 ,30mg: $16.76-18.52
Methylphenidate ER	Jornay PM Capsule	Time to Peak: Adults: 14hr	10-12hr	20,40,60,80,100mg: $17.37

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Methylphenidate ER	Metadate ER Tablet *Brand name discontinued*	Clinical Onset: 20-60 min Time to Peak: 5hr	6-8hr	10, 20mg: $7.5-8.25
Methylphenidate Chewable ER	QuilliChew ER Tablet	Time to Peak: Adults 5 hr.	6-8hr	20,30, 40mg: $14.91
Methylphenidate ER	Quillivant XR **Suspension**	Clinical Onset: 30-60min Time to Peak: Children: 4hr Adolescents: 2hr	6-8hr	25mg/5mL: $3.39 (Per mL)
Methylphenidate ER	Relexxii Tablet	Clinical Onset: Initial 1 hr Followed by gradual ascending conc. 5-9hr Time to Peak: 5 to 9 hrs.	12hr	45mg, 63mg 72mg: $25.44-$27.62
Methylphenidate SR	Ritalin SR Tablet *DISCONTINUED*	Clinical Onset: 60-180min Time to Peak: Initial 5hr	6-8hr	20mg
Methylphenidate LA **-Beaded Controlled release** -50% IR/50 ER	Ritalin LA Capsule Available in Generic	Clinical Onset: 30-60min Time to Peak: 5hr	6-8hr	10,20,30,40mg, 50,60mg: $13.78-14.49

Initial Dose	Titrate Weekly	Dosing Range	Max Dose
Adhansia XR ***Discontinued*** **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			

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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 **Children ≥6 yr.:** 17.3 mg once daily in the morning	8.6-17.3 mg	--	51.8mg/**day**
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**	60mg/**day**

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		substitute on mg-per-mg basis.	
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**
Patients currently receiving immediate-release methylphenidate: The same total daily dose of Ritalin LA should be used			
Patients currently receiving methylphenidate SR, brand name Ritalin SR * *Discontinued:** The same total daily dose of Ritalin LA should be used			
Daytrana Transdermal Patch: [Voluntary Recalled in May 2021] **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)	Increase to next transdermal patch dosage size no more frequently than every week	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.	

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 patients 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

****Approximate ORAL methylphenidate equivalents, with a 9-hr patch wear time, for the 20mg and 30mg patches (Arnold 2007)**

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]

Table 3 Central Nervous System Stimulants- Dexmethylphenidate

Generic Name	Brand Name		Onset	Duration of Action	Pricing & Formulation
Dexmethylphenidate IR	Focalin [Tablet]		Clinical Onset: 30min Time to Peak: 1-1 ½ hr	3-5 hr.	2.5mg:$0.76 5mg: $1.08 10mg: $1.56
Initial Dose	Dosing Range	Titrate Weekly	Max Dose		
Children ≥6 years: 2.5mg twice daily (8a.m. and noon)	5-20mg	2.5-5mg	20mg/day; however, some may require and tolerate up to 50mg/day		
Generic Name	Brand Name		Onset	Duration of Action	Pricing & Formulation
Dexmethylphenidate **Extended Release 24 Hour** -Bi-model release 50 IR/50 ER	Focalin XR Capsule		Clinical Onset: 30 min Time to Peak: Initial 1 ½ hr	12 hr.	5mg: $10 10mg: $15 20mg: $15 25mg: $16

-Can be sprinkled on food		Second 6 ½ hr		30mg: $15 35mg: $17 40mg: $ 15
Dosing Recommendations				
Initial Dose	Dosing Range	Titrate Weekly	Max Dose	
Children ≥6 years: 5mg once daily 8a.m.	5-30mg	5mg/day	30mg/day; however, some may require and tolerate up to 50mg/day	

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

Table 4 Amphetamine

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 Brand: $11.76
Amphetamine IR	Evekeo ODT	5, 10, 15, 20mg	Onset of action: 30-60min Time to peak: 3 hr	4-6hr	$8.83
Amphetamine IR	Evekeo Tablet	5, 10mg	Onset of action: 30-60min Time to peak: 3 hr	4-6hr	$9.08
Amphetamine/ Dextroamphetamine Extended release	Adderall XR Capsule	5, 10,15, 20, 25, 30mg.	Onset of action: 30-60min Time to Peak: 7hr	6-9hr	$ 8.55
Amphetamine/ Dextroamphetamine Extended release	Mydayis Capsule	12.5, 25, 37.5,50mg	Onset of action: 30-60min Time to Peak: 7hr	6-9hr	$13.55
Amphetamine XR	Adzenys XR-ODT Tablet Adzenys ER [Suspension] **Discontinued**	3.1, 3.6, 9.4, 12.5, 15.7, 18.8mg 1.25mg/mL *Discontinued **	Time to Peak: 5- 7hr	10-11hr	$19.15

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Amphetamine XR	Dyanavel XR Suspension Dyanavel XR Chewable	2.5mg/mL 5,10,15,20 mg	Time to Peak: 5- 7hr	10-11hr	$3.47 per mL $9-17
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
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	$14.77 $13.85

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	2.5mg given in one or two divided doses.	10-40mg Use intervals of 4 to 6 hrs. between doses.	40mg/day

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use in children ≤5 yrs. due to insufficient evidence **Children: ≥6yr:** 5mg once or twice daily	5mg given in one or two divided doses. Some patients may require daily dose to be administered as 3 divided doses per day		Patients >50Kg: May require and tolerate 60mg/day divided doses.
Adderall XR: **Children 6 to 12 yrs.:** 5 to 10mg once daily in a.m. **Adolescents 13 to 17 yrs.:** 10mg once daily in a.m.	5-10mg 20mg	5-30mg	≤50Kg: 30mg/day >50Kg: 60mg/day ≤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.

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Evekeo: **Children 3 to 5 yrs.:** 2.5mg once daily **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.	2.5mg	--	**Maximum dose not specified**; In children ≥6yrs. Daily doses > 40mg/day are rarely necessary.
Adzenys XR-ODT and Adzenys XR-Suspension: **Children≥6yrs.:** 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

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Children ≥6yr: 5mg once or twice daily with first dose in the morning	5mg	Usual range 5 to 20mg/day	**NOT** recommend use in children ≤5yrs. Due to 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

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B. Non-Stimulant Pharmacologic Treatments:

I. Selective norepinephrine reuptake inhibitor.

a. Adverse Reactions:

i. Tachycardia, increased blood pressure
ii. nausea
iii. Drowsiness, headache, insomnia
iv. Hyperhidrosis (atomoxetine)
v. Erectile dysfunction (atomoxetine)

b. US Boxed Warning:

i. Suicidal ideation in patients

c. **Medications**

Products:	Formulations Capsules	Price (per each)-Average Wholesale Price
Atomoxetine Capsule Generics	10, 18, 25, 40,60, 80, 100mg	$14.22-16.69
Qelbree ER Capsule	100, 150, 200mg	$13.44

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 *CYP2D6* 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 CYP2D6 and CYP2C19 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 CYP2D6 poor metabolizers, if tolerating therapy but inadequate	80mg/day		100mg/day

	response, may increase after min. of 4 weeks to 80mg/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 m2): 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			

II. **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.

a. **Adverse Reactions of Alpha 2 agonists:**
   i. Bradycardia
   ii. Hypotension
   iii. Drowsiness: Schedule at bedtime

b. **Medications**

Formulations	Price (per each)-Average Wholesale Price
Clonidine Generic Tablet: 0.1, 0.2, 0.3 mg	$0.05-0.63
Clonidine ER,12-hour Tablet 0.1 mg	$4.5-7.95
Clonidine ER, 24-hour Tablet 0.17mg	$19.74
Kapvay (Clonidine Brand) Tablet 0.1mg	$2.23
Clonidine Patch generic: 0.1, 0.2, 0.3 mg/ 24hr	$33, $56, $77.45

Generic Name	Titrate Weekly	Pharmacokinetics	Max Dose
Clonidine IR Children ≥6yr: ≤ 45Kg: 0.05mg once at bedtime. **>45Kg:**	0.05mg/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	27 to 40.5Kg: 0.2mg/day 41 to 45Kg: 0.3mg/day

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0.1mg once at bedtime Note: When discontinuing therapy, taper over 1 to 2 weeks	0.1mg /day Given twice daily, then 3 times daily, then 4 times daily	-Hepatic metabolism -Renally Cleared	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**	

Generic Name	Titrate	Max Dose	Price (Per each)
GuanFACINE IR: **Children ≥6yr:** **≤ 45Kg:** 0.5mg once daily at bedtime **>45Kg:** 1mg once daily at bedtime	0.5mg / day every 3-4days. -0.5mg twice daily, then 0.5mg three times daily, then 0.5mg four times daily. 1mg day every 3-4days -1mg twice daily, then 1mg three times daily, then 1 mg four times daily.	27 Kg - 40.5Kg: 2mg/**day** 41 - 45Kg: 3mg/**day** 4mg/**day**	1mg: $1 2mg: $1.5
GuanFACINE ER Intuniv Tablet: **Children ≥6yr:** 1mg once daily ----------	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.	**Monotherapy:** 6-12 yrs.: 4mg/day 13-17 yrs.: 7mg/day	1,2,3,4mg: $10.49 Brand name:

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Conversion from IR Guanfacine to ER: Discontinue IR and initiate ER at the dose recommended	**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.	**Adjunct therapy (with psychostimulants):** 4mg/day	$11.66

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

a. **Adverse Reactions of Bupropion:**

i. Dry mouth
ii. Tachycardia
iii. Weight loss
iv. Auditory disturbance

b. **US Boxed Warning:**

i. Suicidal ideation in patients < 24 years.

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

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	Generic 100mg: $ 0.28-1.94 150mg: $0.3-1.94 200mg: $0.56-3.83
Bupropion XL 24-hour extended release [Wellbutrin XL Tablet] Swallow Tablet as Whole		450mg/day	Generic 150mg: $0.33-5.2 300mg: $0.31-6.3 450mg: $16-17

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

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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 adenyl cyclase, 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.

a. Adverse Reactions of Tricyclic Antidepressants:

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

b. Medications

Initial Dose	Titrate Weekly	Max Dose	Price
Desipramine **Children 5 to < 7 yrs.:** 0.75mg/kg/dose twice daily	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
Children ≥7 yrs.: 25mg once daily at bedtime	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

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